Preface

This manual describes information related with product repair. To repair the product properly, please read this manual carefully.

This manual is applicable to the following model:

RD98X (X may indicate 2, 5, 6 or 8.)

Contents

1. Revision History

Version	Date	Description
R2.0	09-2010	Initial Release
R3.5	06-2011	VHF, UHF2 and UHF3 service information is included.

2. Copyright Information

3. Disclaimer

The Company endeavors to achieve the accuracy and completeness of this manual, but no warranty of accuracy or reliability is given. All the specifications and designs are subject to change without notice due to continuous technology development. No part of this manual may be copied, modified, translated, or distributed in any manner without the express written permission of us.

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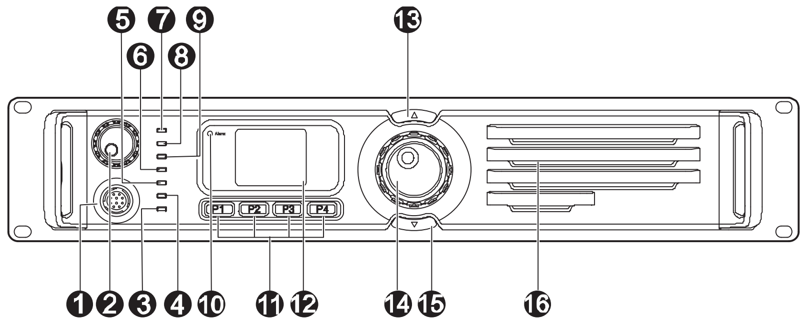
4. Introduction

Intended User

This manual is intended for use by qualified technicians only.

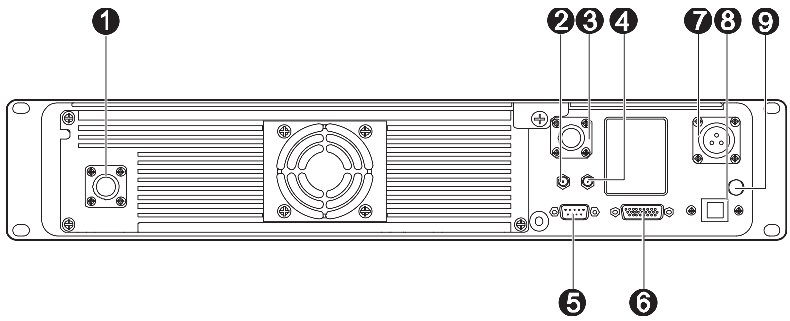
5. Product Controls

Front Panel



No.	Part Name	No.	Part Name
1	Accessory Jack	9	Slot 1 RX Indicator
2	Volume Control Knob / Power Indicator	10	Alarm Indicator
3	Repeater Mode Indicator	11	Programmable Key
4	Analog Mode Indicator	12	LCD Display
5	Slot 2 RX Indicator	13	Channel Up (CH+)
6	Slot 2 TX Indicator	14	Navigation Knob
7	Digital Mode Indicator	15	Channel Down (CH-)
8	Slot 1 TX Indicator	16	Speaker

Rear Panel



No.	Part Name	No.	Part Name
1	TX Antenna Interface	6	Accessory Jack
2	Optional Interface 1	7	DC Power Interface
3	RX/Duplex Antenna Interface	8	Ethernet Port
4	Optional Interface 2	9	Ground Screw
5	Monitor/Tuning Interface		

6. Baseband Section

6.1 Front Panel

6.1.1 Overview

The front panel is the control panel, where you can see keys, Volume Control knob, Navigation knob, LED indicator, LCD display and 10-Pin interface. The front panel is connected to the baseband board via 40-Pin FFC. See the following figure:

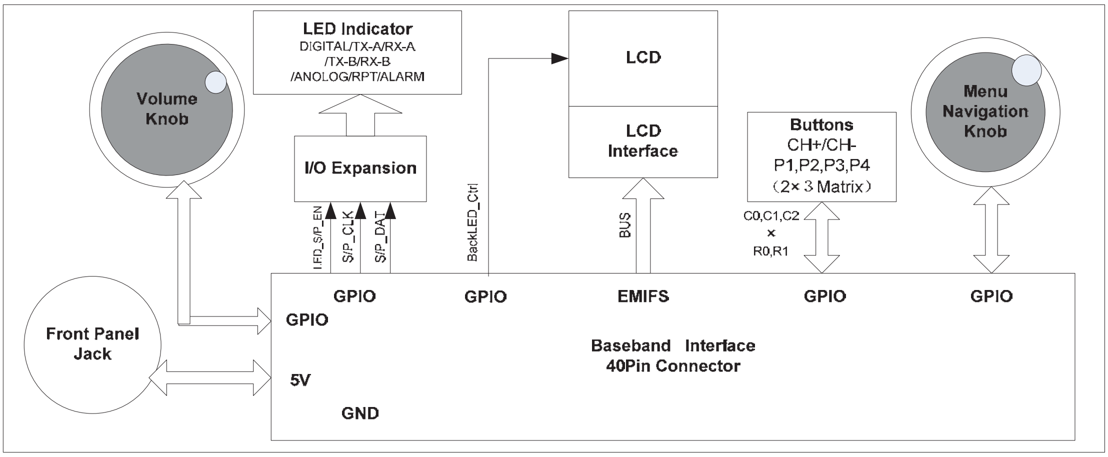


Figure 6-1 Front Panel Overview

6.1.2 Keys and Knobs

The keys on the front panel are controlled by key matrix of TX OMAP5912 (U102), and the Volume Control knob and Navigation knob are controlled by GPIO of TX OMAP5912 (U102). See the following figure:

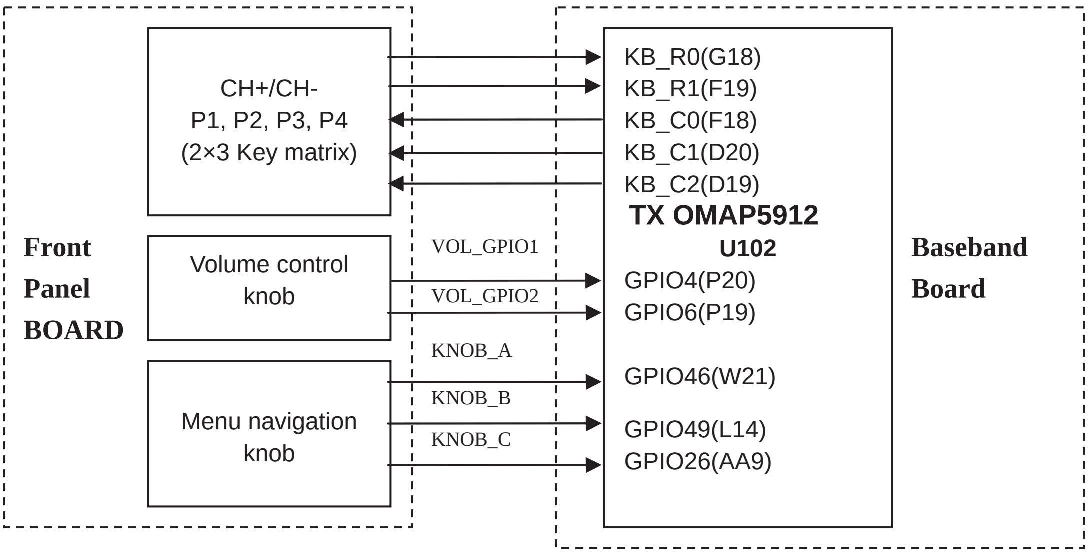
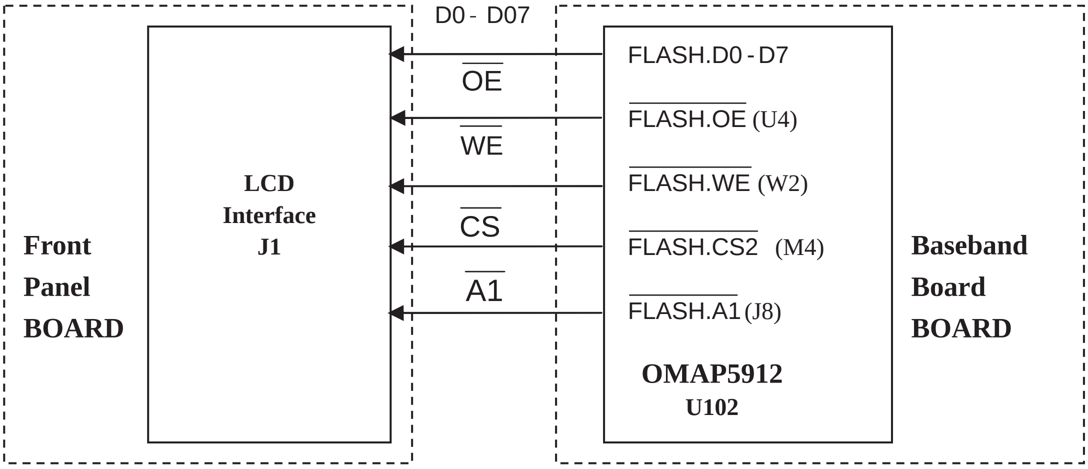


Figure 6-2 Key and Knob Control Diagram for the Front Panel

6.1.3 LCD Display

To enhance LCD refreshing rate, parallel data interface is used. It connects to EMIFS data bus of TX OMAP5912 (U102) and the chip select is subject to the control of $\overline{\text{FLASH.CS2}}$. See the following figure:



6-3 LCD Control Diagram

6.1.4 LED Indicator

The 9 LED indicators on the front panel are controlled by the IO chip (U1), while the backlight of LCD and keypad is controlled by the IO chip (U401) of baseband board. See the following figure:

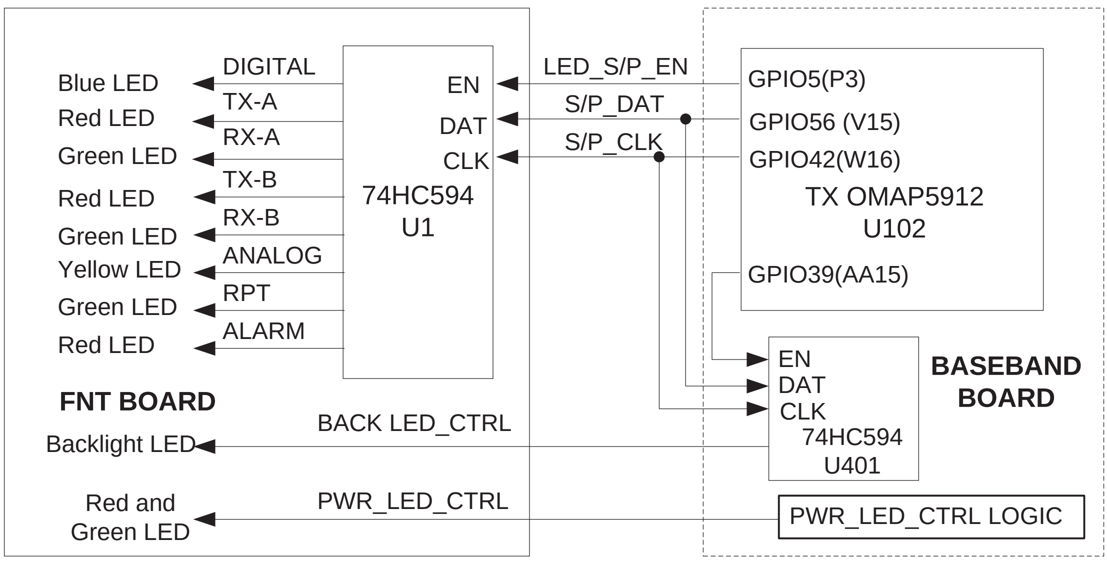


Figure 6-4 LED Control Diagram for the Front Panel

6.1.5 10-Pin Interface

The 10-Pin interface on the front panel is used to connect the audio accessory or data cable. Its definition is as below:

Pin No.	Name	Description
1	Accessory identification port 1	To form an accessory identification

		matrix with Pin 10.
2	PTT input	3.3V CMOS, valid for low level
3	Handset output	This pin can output received audio, when Handset is checked in the CPS.
4	USB0_D-	When this pin is used for USB, USB of DB26 will be disabled
5	GND	For grounding
6	USB_VBUS	5V/500mA
7	Mic input	MIC signal input of palm microphone
8	USB0_D+	When this pin is used for USB, USB of DB26 will be disabled
9	HOOK	Reserved
10	Accessory identification port 2	To form an accessory identification matrix with Pin 1.

Table 6-1 10-Pin Interface Description

6.1.6 Interface between Front Panel and Baseband Board

The interface is used to connect baseband board and front panel. Its definition is as below:

Pin No.	Name	Description
1	MMP10_Mic_IN	Mic signal input
2	MIC_GROUND	Mic signal ground
3	MMP_ACC_IO1	Accessory detection input
4	V_BUS	5V power supply (USB)
5	MMP_PRGM_IO4	Programmable key input
6	MMP_PRGM_IO3	Programmable key input
7	USB0_D-	USB data -
8	USB0_D+	USB data +
9	MMP_PRGM_IO0	Programmable key input
10	KNOB_A	Navigation knob input
11	KNOB_B	Navigation knob input
12	MMP10_SPK_AUDIO	SPK signal output

13	VOL_GPIO1	Volume control knob input
14	VOL_GPIO2	Volume control knob input
15	KNOB_C	Navigation knob input
16	BACKLED_CTRL	Backlight control signal output
17	$\overline{\text{RST-OUT_TX}}$	LCD reset signal
18	KB_C0	Keypad matrix signal output
19	KB_C1	
20	KB_C2	
21	KB_R0	Keypad matrix signal input
22	KB_R1	
23	DC_PWR_LED_CTRL	DC power LED control
24	LED_S/P_EN	IO chip select signal
25	S/P_CLK	IO chip clock signal
26	S/P_DAT	IO chip data signal
27	$\overline{\text{OE_LCD}}$	LCD read signal
28	$\overline{\text{WE_LCD}}$	LCD write signal
29	CS2_LCD	LCD chip select signal
30	F_A1_LCD	LCD command/data address selection
31	F_D7_LCD	LCD data bus
32	F_D6_LCD	
33	F_D5_LCD	
34	F_D4_LCD	
35	F_D3_LCD	
36	F_D2_LCD	
37	F_D1_LCD	
38	F_D0_LCD	
39	GND	For grounding
40	5V_GPS	5V power supply for front panel

Table 6-2 40-Pin Interface Description

6.2 Main Board

6.2.1 Overview

Baseband board consists of main chip (TX OMAP and RX OMAP), audio processing chip (CODEC) and peripheral equipment. See the following figure:

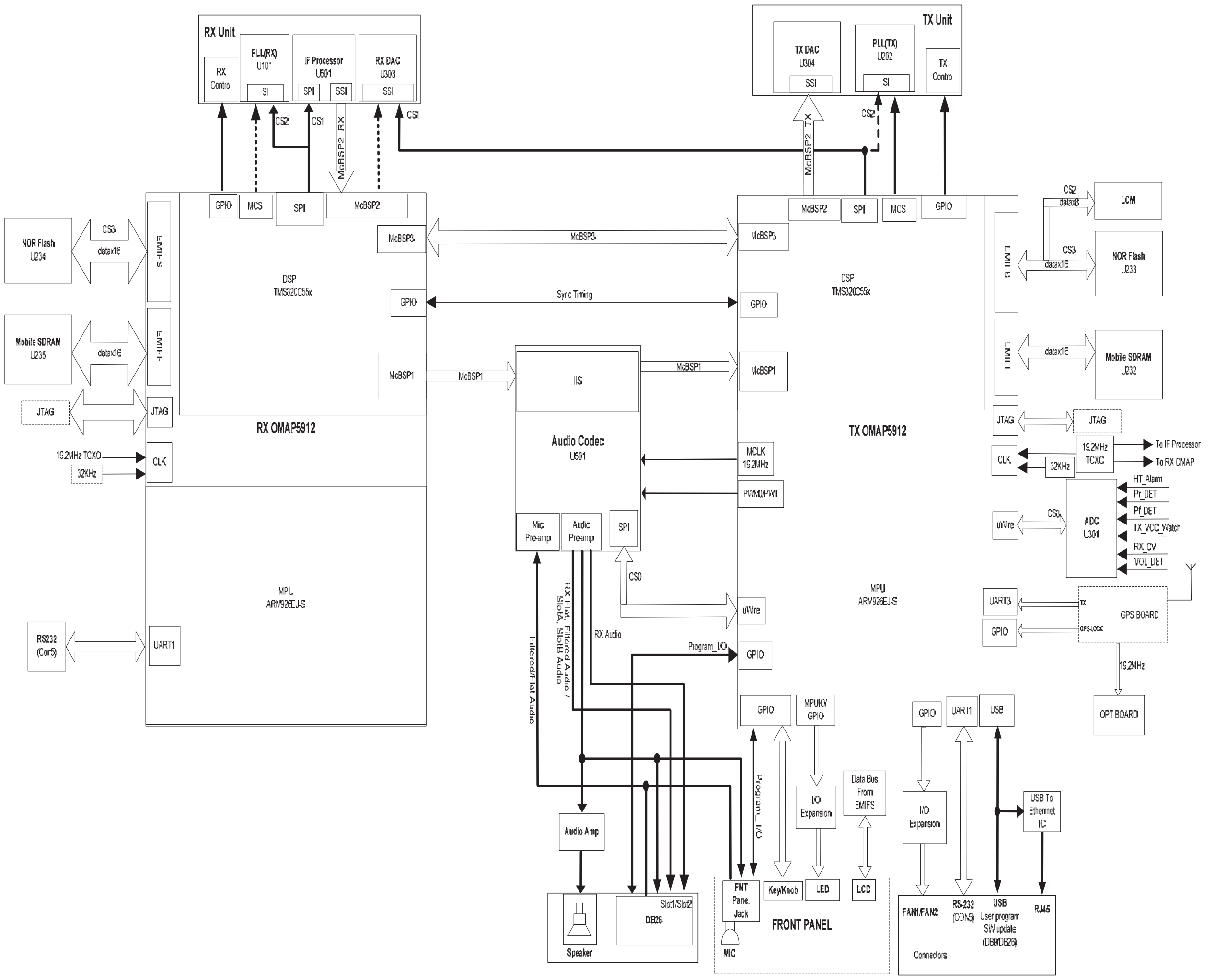


Figure 6-5 Baseband Block Diagram

As a highly integrated hardware platform, OMAP5912 incorporates 2 processors: ARM+DSP. The function of RX OMAP and TX OMAP is described below:

- RX OMAP5912

(1) ARM: Reserved.

(2) DSP: to handle the algorithm of RX baseband signal and to control SPI, McBSP1 and McBSP3

- TX OMAP5912

(1) ARM: To run MMI software, part of stack software and related peripheral devices such as UART1, UART3, USB, KEYPAD, LCD and LED.

(2) DSP: to handle the algorithm of TX baseband signal and to control SPI, McBSP1 and McBSP3

6.2.2 Power Supply Description

Both PA circuit and baseband circuit are powered by the external power supply directly. The power supply circuit for the baseband board supplies power for the baseband circuit and its auxiliary modules, and provides 9.3V voltage for the exciter board and RX board. After the DC power supply is connected, the baseband board is powered up, and provides 13.6V voltage for the external development interface via OMPA control. See the following figure:

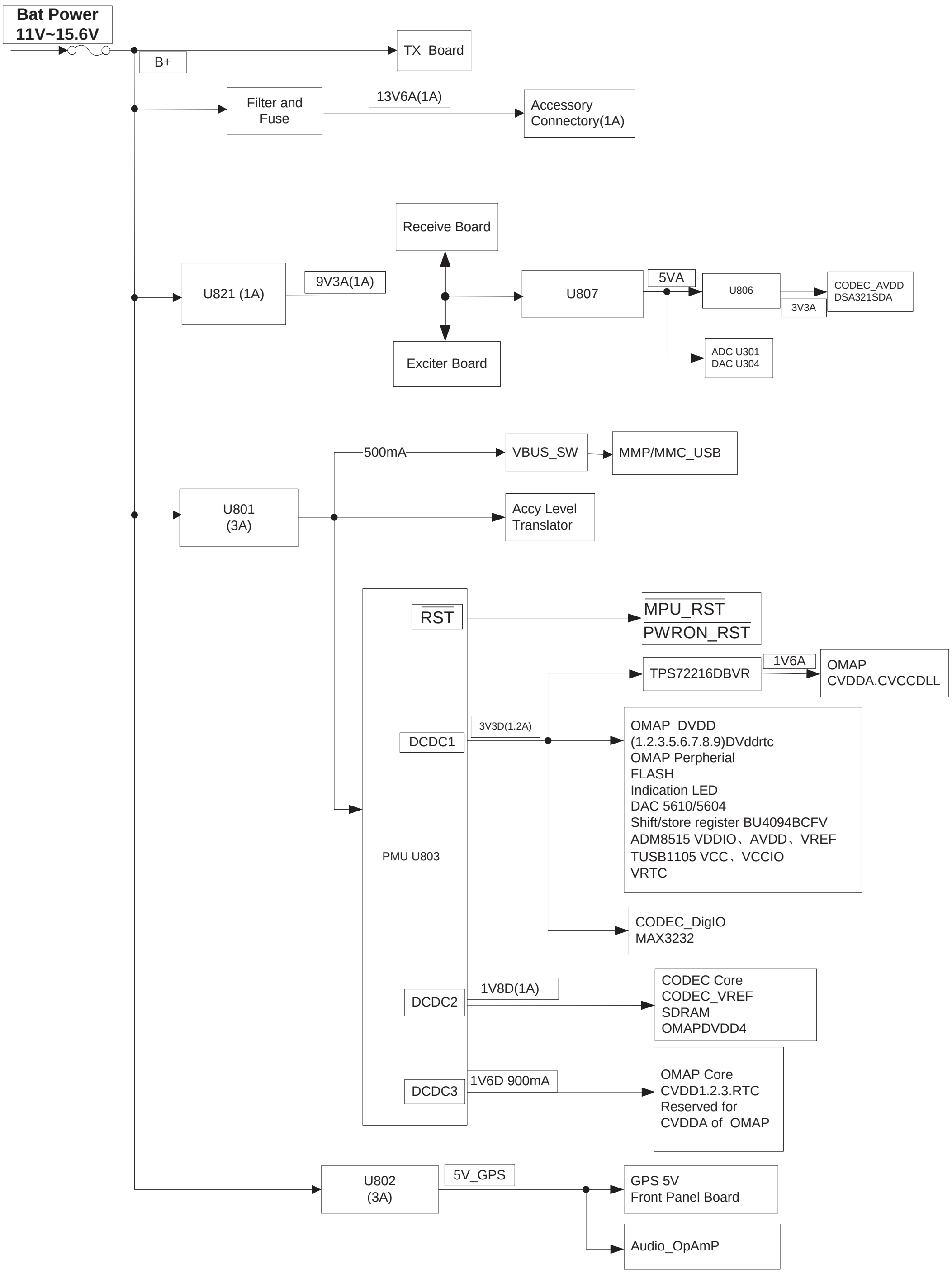


Figure 6-6 System Power Supply Block Diagram

After going through the filter and protection circuit, the 13.6V power supply will power external devices via the expansion interface. The current may be up to 1A. For the 9V3A power supply, it is supplied by U821, and output by ADJ with current up to 1A. It is used to power part of the exciter, RX and baseband circuit. The U821 output control pin is valid at low level, and is grounded. It can output 9.3V power after power-on. As for U807, it receives 9V3A power and outputs 5V power, which powers the D/A conversion chip and power management IC (U806). U806 supplies power (3V3A) for CODEC chip (U501). The U807 output control pin is valid at high level. It can output 5V power after power-on.

U801 is a DC-DC chip with adjustable output. After receiving 13.6V power, it will output 5VD power, which supplies U803 and USB with 5V power. U803 is a PMU chip. It has 3 DC-DC output pins and 2 LDO output pins. U803 is configured by OMAP via the I^2C interface. Description of DC-DC pins is shown below:

1) DC-DC1 is controlled by U803 (PIN10). When the level is 0/1, the DC-DC1 output will be 3V/3.3V. The maximum current is 1.2A.
2) DC-DC2 is controlled by U803 (PIN32). When the level is 0/1, the DC-DC2 output will be 1.8V/2.5V. The maximum current is 1A.
3) DC-DC3 is controlled by U803 (PIN1). It can output 1V6D power. The maximum current is 900mA.

6.2.3 Reset

When the system is powered on, PMU will generate a reset signal “PWR_RST” to reset RX OMAP and TX OMAP. When the system works abnormally, the watchdog will generate a 220ms reset signal as well. See the following figure:

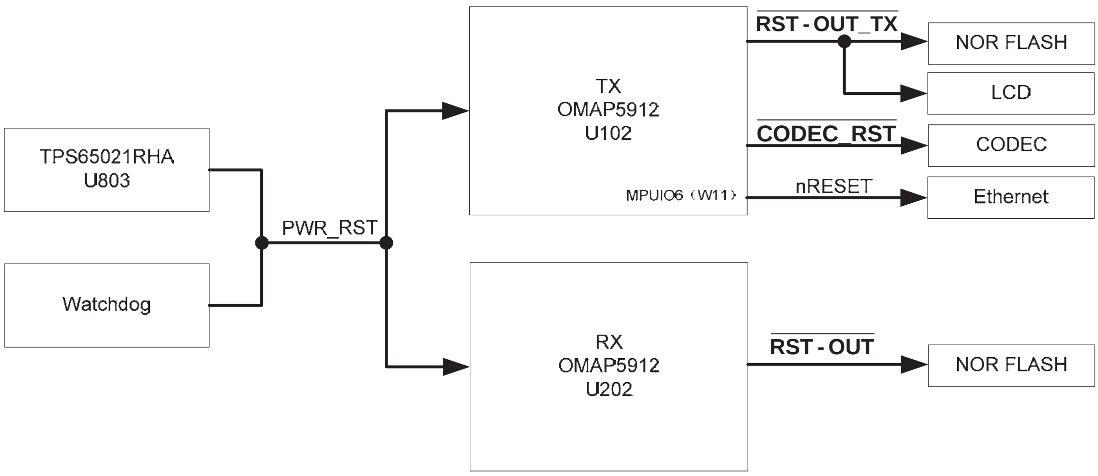


Figure 6-7 System Reset Block Diagram

After making response to power-up reset, OMAP5912 will output $\overline{RST_OUT}$ signal, and maintain low level for some time to reset the peripheral equipment (NOR Flash) of OMAP. For CODEC chip (U501), its resetting is subject to MPUIO6 of TX OMAP. The reset sequence of OMAP5912 is shown below:

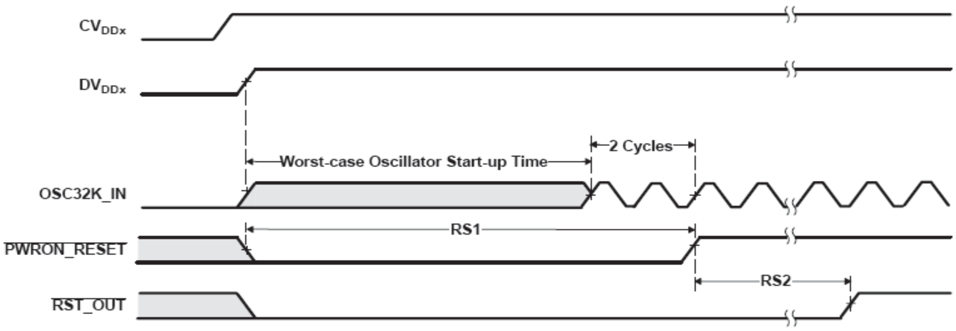


Figure 6-8 Reset Sequence

6.2.4 Clock

OMAP5912 requires two clocks: system clock and 32K clock. The system clock (12MHz, 13MHz or 19.2MHz) can be provided by an external oscillator or square-wave clock signal. This product's system clock is provided by 19.2MHz TCXO. Both system clock and 32K clock are provided by ULPD (Ultralow-power device), which is responsible for OMAP clock management. The clock output by UPLD is connected to appropriate external interface. See the following figure:

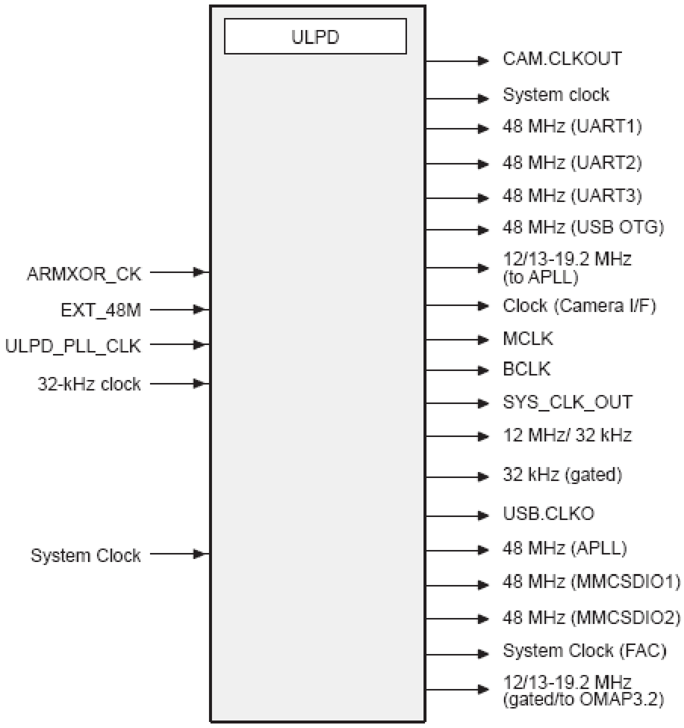


Figure 6-9 External Clock

For the built-in and external clock of OMAP2912, there are two reset modes: Reset Mode0 and Reset Mode1. Reset Mode0 is adopted for this system. As for this product, system clock uses external clock, while 32K clock uses built-in clock. See the following figure:

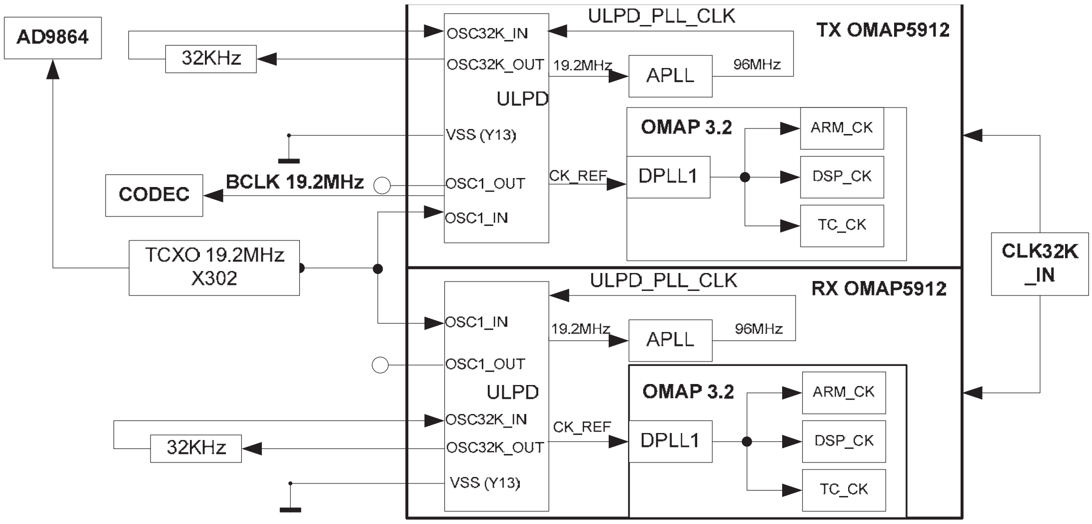
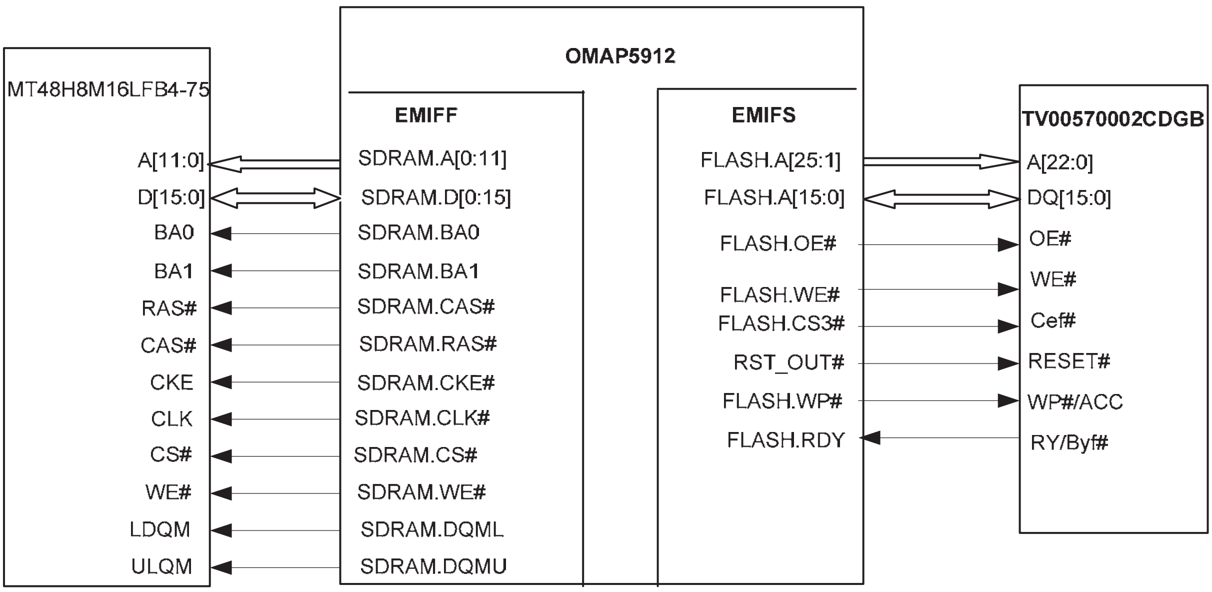


Figure 6-10 Clock Connection Block Diagram

6.2.5 Memory

OMAP5912 provides two types of external memory interfaces: external memory interface slow (EMIFS) and external memory interface fast (EMIFF). External NOR Flash and Mobile SDRAM have been expanded for two OMAPs in the system. See the following figure:



6-11 Memory Block Diagram

6.2.6 MCBSP

OMAP5912 has 3 McBSP interfaces: McBSP1, McBSP2 and McBSP3. McBSP1 of RX OMAP and TX OMAP is used to communicate with Codec. RX OMAP McBSP2 is used to connect SSI interface of

AD9864 to receive demodulation signal from AD9864, and TX OMAP McBSP2 is reserved for SPI interface of RX DAC TLV5614. McBSP2 of TX OMAP is used to connect SSI interface of TX DAC TLV5614. TLV5614 works in Slave mode and is managed by DSP. McBSP3 is used to connect RX OMAP and TX OMAP for data transmission. See the following figure:

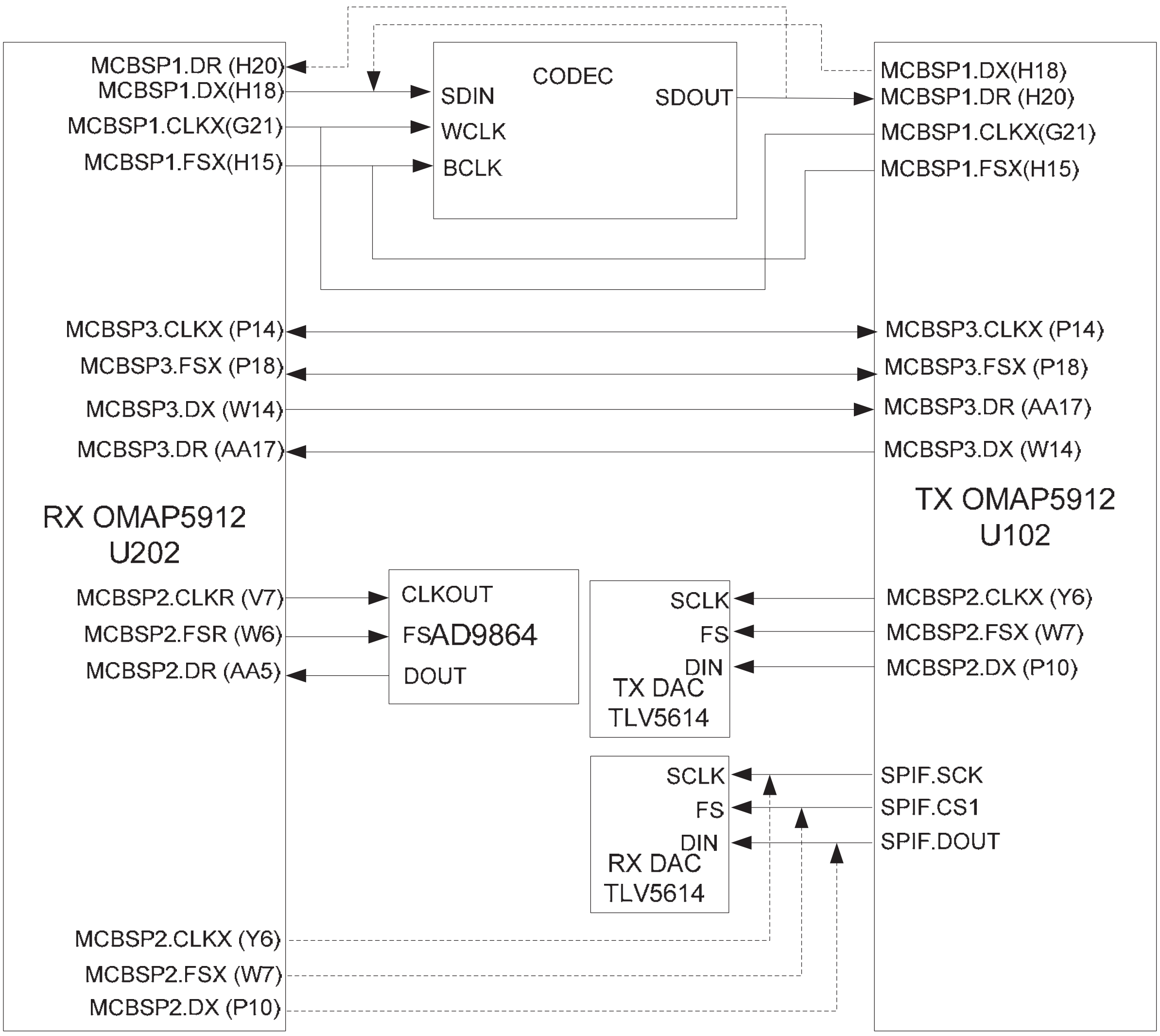


Figure 6-12 Diagram of MCBSP Connection

6.2.7 SPI

OMAP5912 has one SPI interface that can connect four SPI components. The descriptions are as follow:

(1) RX OPMAP5912 SPI Interface

The SPI interface of RX OMAP is used to configure IF processor (AD9894) and RX PLL chip (SKY72310).

AD9894 is controlled by SPI chip select (CS1) of RX OMAP, and RX PLL chip is controlled by CS2. The connection between RX OMAP SPI interface and AD9894/ RX PLL is shown below:

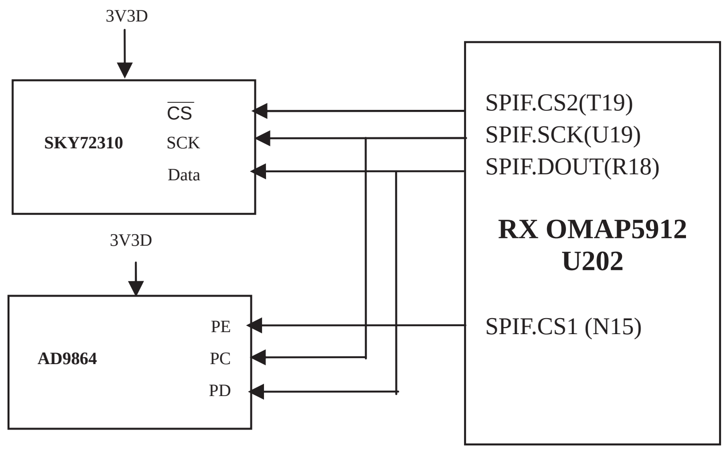


Figure 6-13 RX OMAP SPI Connection Block Diagram

(2) TX OPMAP5912 SPI Interface

TX OMAP SPI is used to configure RX DAC TLV5614 (U303) and TX PLL chip (SKY72310). This chip is controlled by CS2 and managed by DSP. RX DAC (U303) is controlled by CS1. See the following figure:

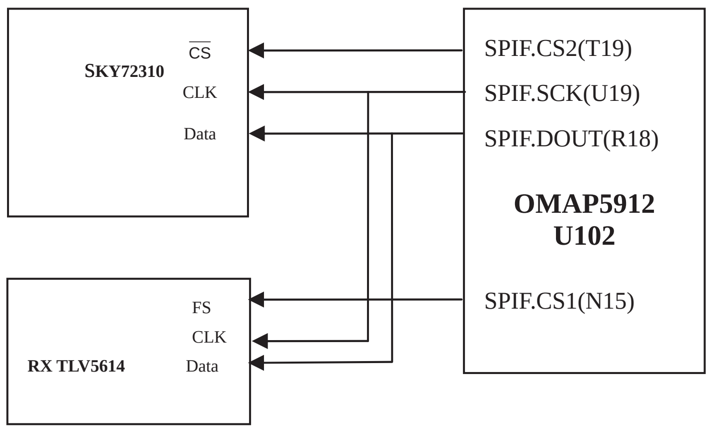


Figure 6-14 TX OMAP SPI Connection Block Diagram

6.2.8 MCSI

MCSI (Multi Channel Serial Interface) belongs to OMAP5912. There are two MCSIs with OMAP5912. MCSI1 of RX/TX OMAP is reserved for appropriate RX/TX PLL chip to realize modulation feature. See the following figure:

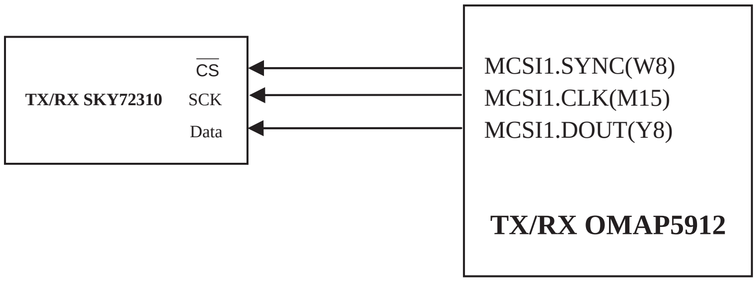


Figure 6-15 Diagram of MCSI Interface

6.2.9 I^2C

OMAP5912 provides one I^2C interface, and supports communication rate up to 400Kbps. TX OMAP I^2C interface connects with PMU to dynamically adjust PMU voltage output. It works in Master mode. See the following figure:

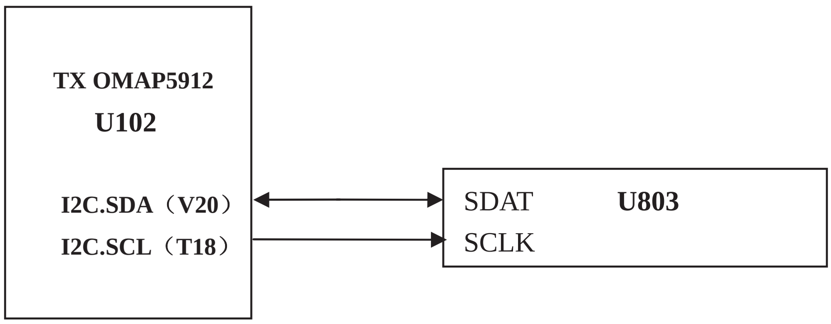


Figure 6-16 Diagram of I^2C Connection

6.2.10 MICROWIRE

OMAP5912 provides a MICROWIRE interface. The four chip select signals can drive four external components. MICROWIRE interface signals include: μWIRE.CS, μWIRE.SCLK, μWIRE.SDO and μWIRE.SDI.

In this system, only MICROWIRE interface of TX OMAP is used to connect CODEC and ADC TLV1548. μWire CS0 controls CODEC and μWire CS3 controls ADC TLV1548. See the following figure:

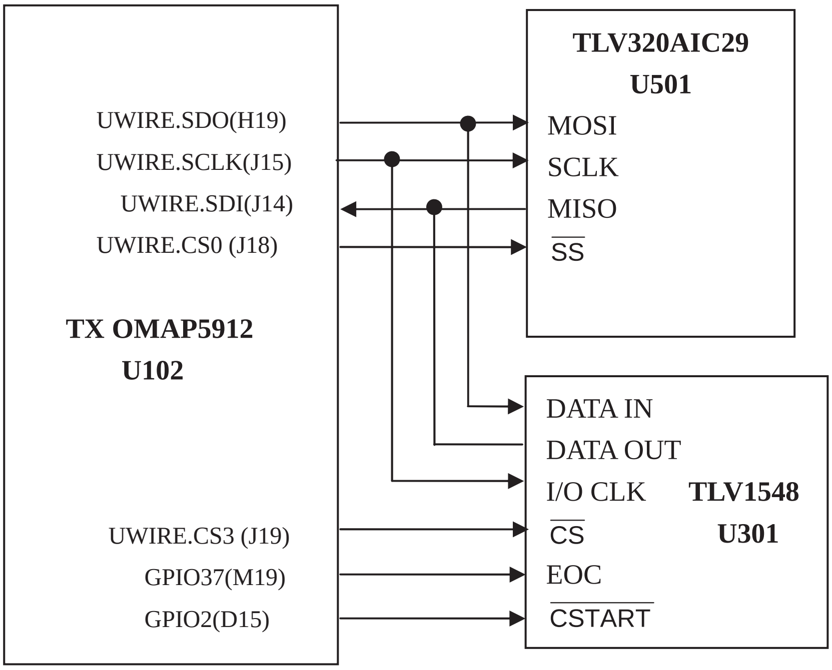


Figure 6-17 Diagram of MICROWIRE Connection

6.2.11 USB

OMAP processor provides 3 USB interfaces with rate of 1.5Mbps or 12Mbps. Available modes include Host and Device. USB0 and USB2 of TX OMAP are used in this system. The description of TX OMAP USB0 is as follow:

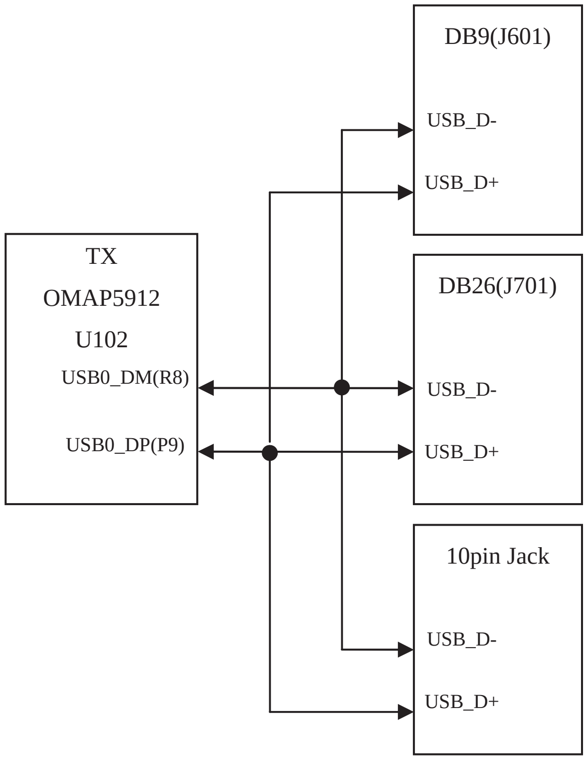


Figure 6-18 Diagram of USB Interface

6.2.12 UART

OMAP5912 has 3 UART interfaces: UART1, UART2 and UART3. It supports hardware flow control. The communication rate can be up to 1.5Mbps. See the following figure:

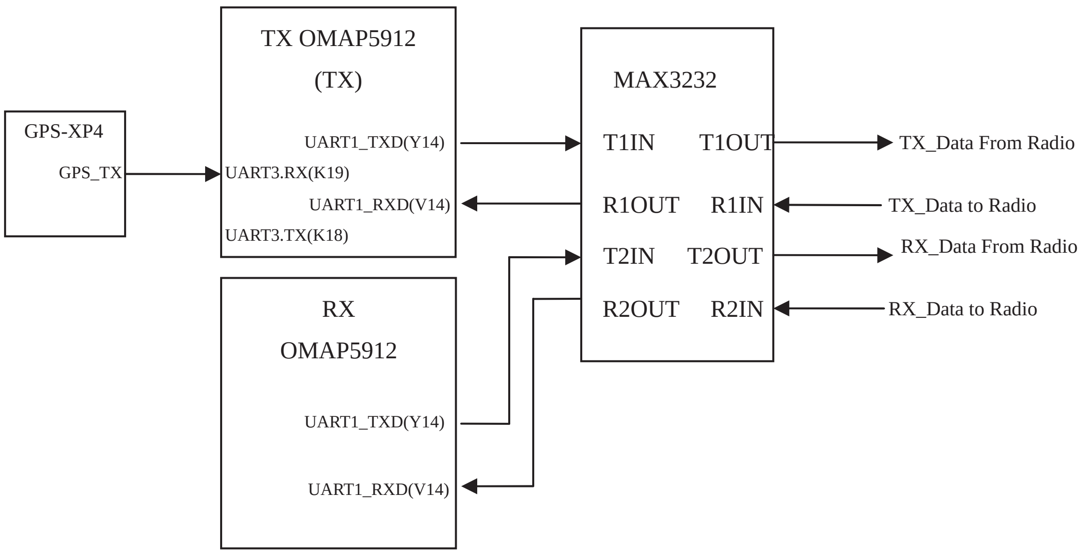


Figure 6-19 UART Connection Block Diagram

6.2.13 GPS (Reserved)

The system can obtain precise clock signal and related GPS data from the GPS module. The baseband board connects with the GPS module via J108 and J109. J109 provides GPS module with 5V power supply. The GPS module provides precise 19.2MHz clock source to exciter board through XS2. See the following figure:

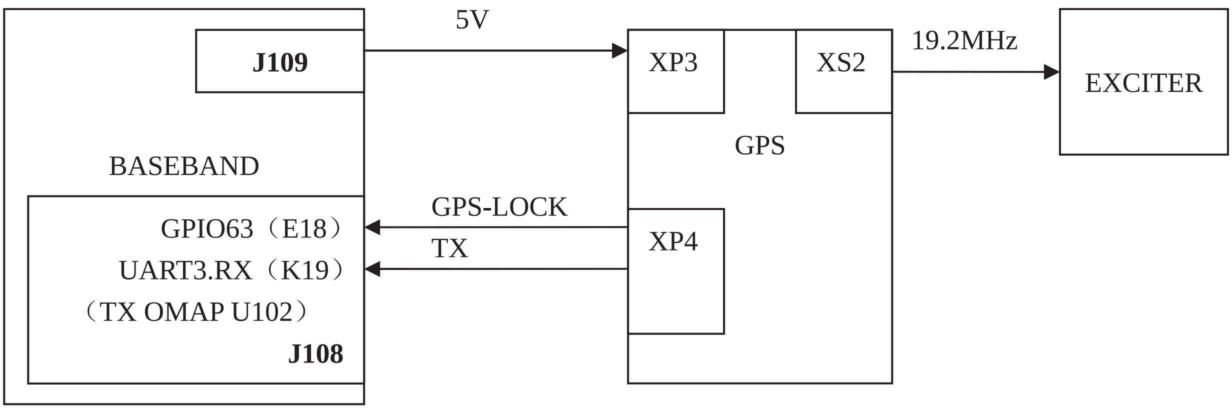


Figure 6-20 GPS Module Connection Block Diagram

The GPS module adopts RS-232 port (baud rate: 9600BPS; 8 data bits; 1 stop bit; no parity check). Definitions of GPS module are shown in table below:

Pin No.	Name	Description
1	GPS-LOCKED	GPS RX status
2	NC	
3	NC	
4	NC	
5	NC	
6	NC	
7	NC	
8	NC	
9	1PPS	GPS pulse output
10	NC	

Table 6-3 GPS Module Definitions

6.2.14 Audio Path

The audio path is used to relay audio, output RX audio and input TX audio.

6.2.14.1 Relay Audio Path

After demodulated by AD9864, RX audio in digital/analog mode goes to RX OMAP. Then the audio is sent to TX OMAP via McBSP3, and finally is subject to DA conversion to modulate VCO.See the following figure:

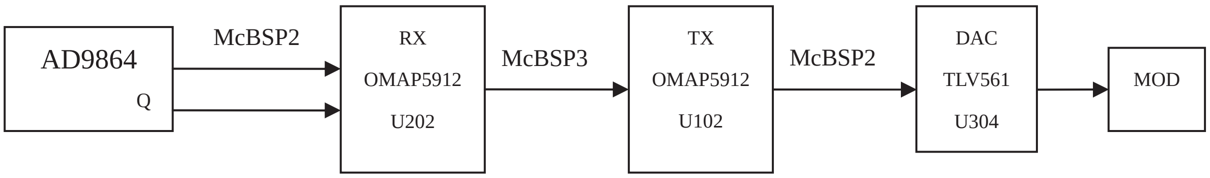


Figure 6-21 Relay Audio Path

6.2.14.2 RX Audio Path

In digital mode, Codec can control the audio output of Slot A from SPK1 and that of Slot B from SPK2 via the left channel and right channel respectively, and select the time slot required for local audio monitoring via the switch Slot1_EN. Meanwhile, under the control of Slot1_EN and Slot2_EN, the outputs of Slot A and Slot B are sent to PIN24 and PIN25 of the further development port DB26 (J701) for further development.

In digital mode, SPK1 of CODEC can be configured to output filtered audio or flat audio (RX_Audio) to the further development port DB26 (J701). The filtered audio from SPK2 is output to the speaker to realize local monitoring via the audio amplifier or to the audio port of the front panel via the filter. See the following figure:

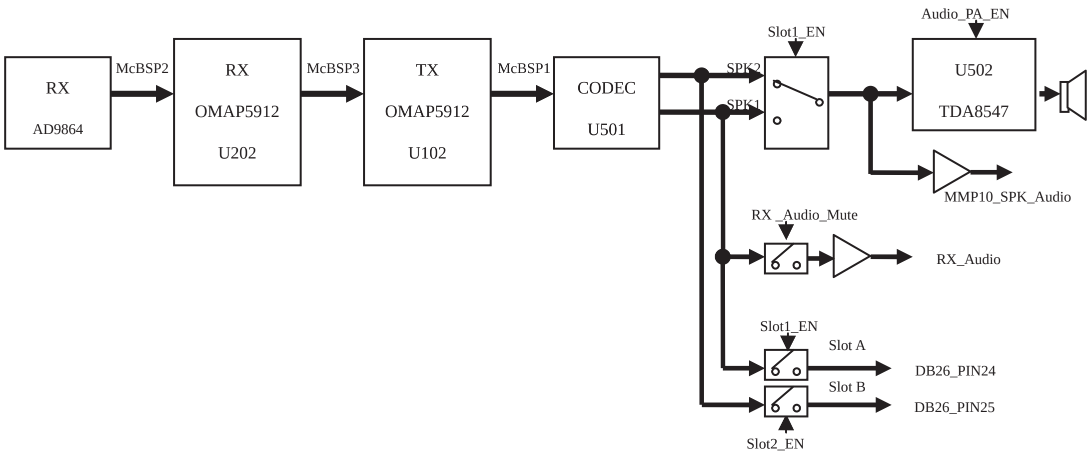


Figure 6-22 RX Audio Block Diagram

6.2.14.3 TX Audio Path

The system has two kinds of MIC audio signals: MMP10_Mic_IN and DB26_Ext_Mic_IN. The former is from the accessory connected to the 10-Pin interface on the front panel, while the latter is from Pin 2 of the further development port DB26 (J701). The EXT_MIC_CTRL signal can be configured through menu or programming software to activate MMP10_Mic_IN or DB26_Ext_Mic_IN. This signal is sent to DSP of TX OMAP via McBSP1 after processed by CODEC, and is transmitted via the TX circuit after DA conversion and modulation. See the following figure:

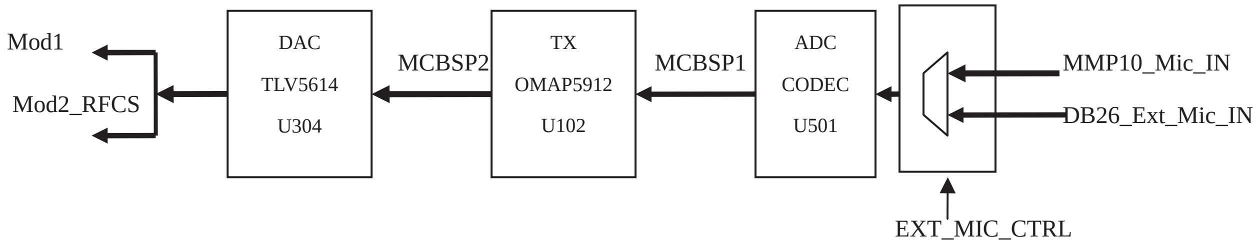


Figure 6-23 TX Audio Path

6.2.15 TCP/IP

TCP/IP is used to achieve remote monitoring and other expandable functions. The block diagram is shown as below:

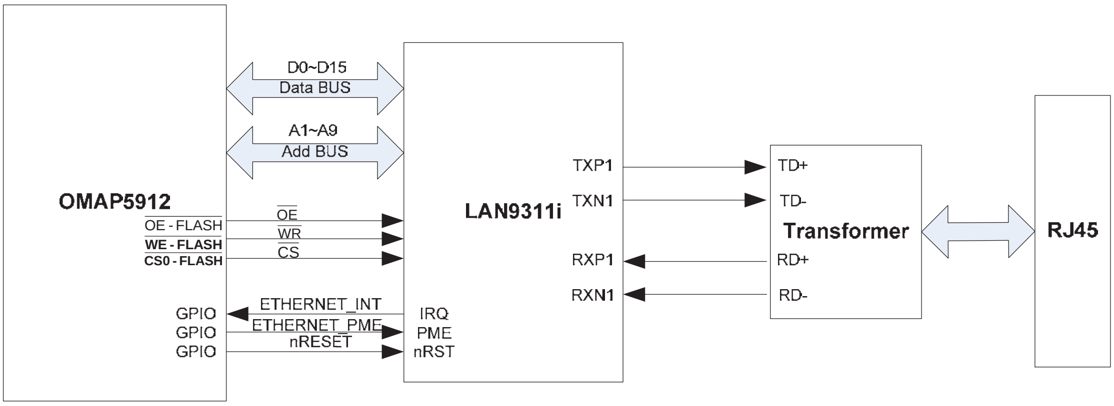
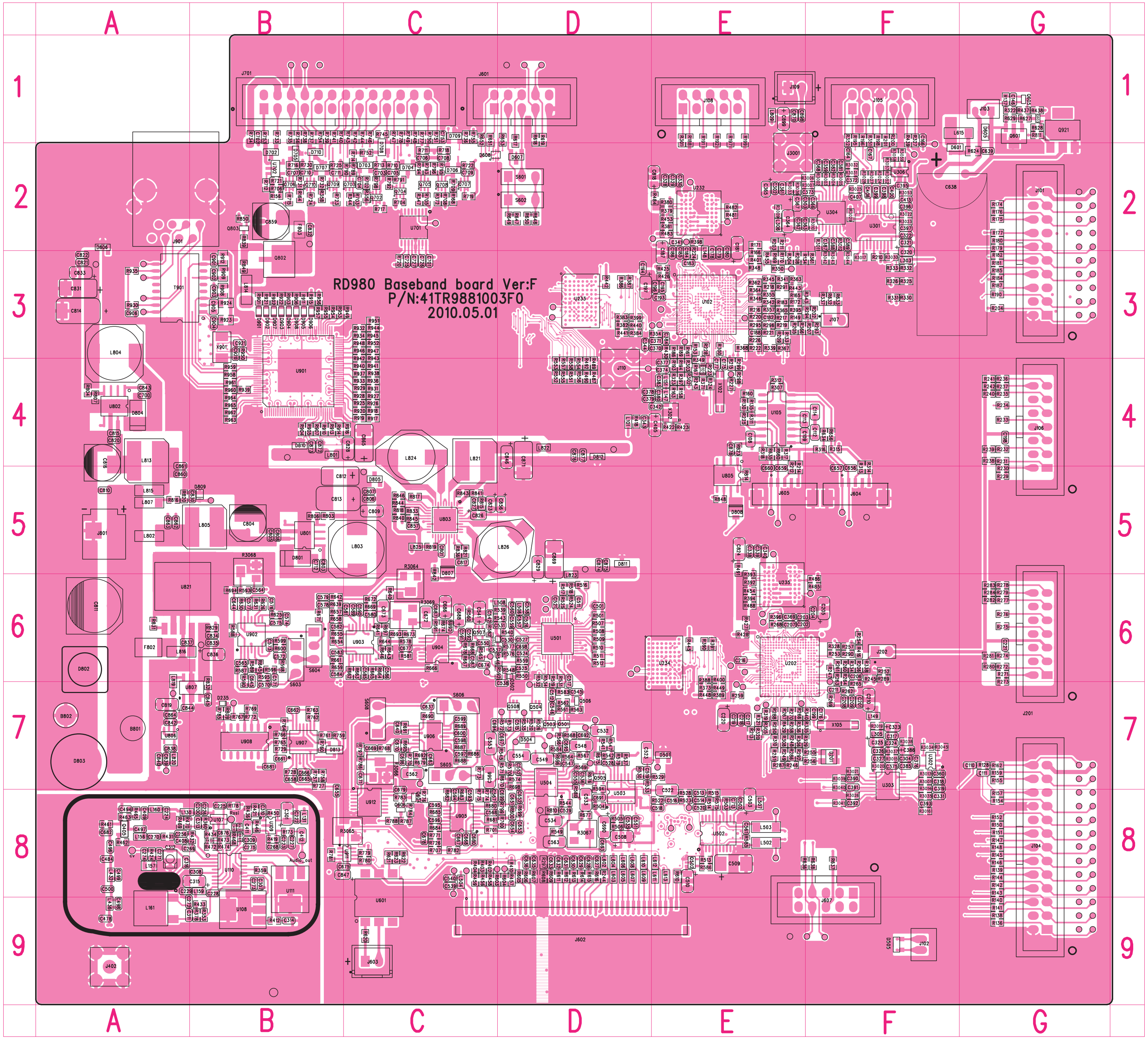


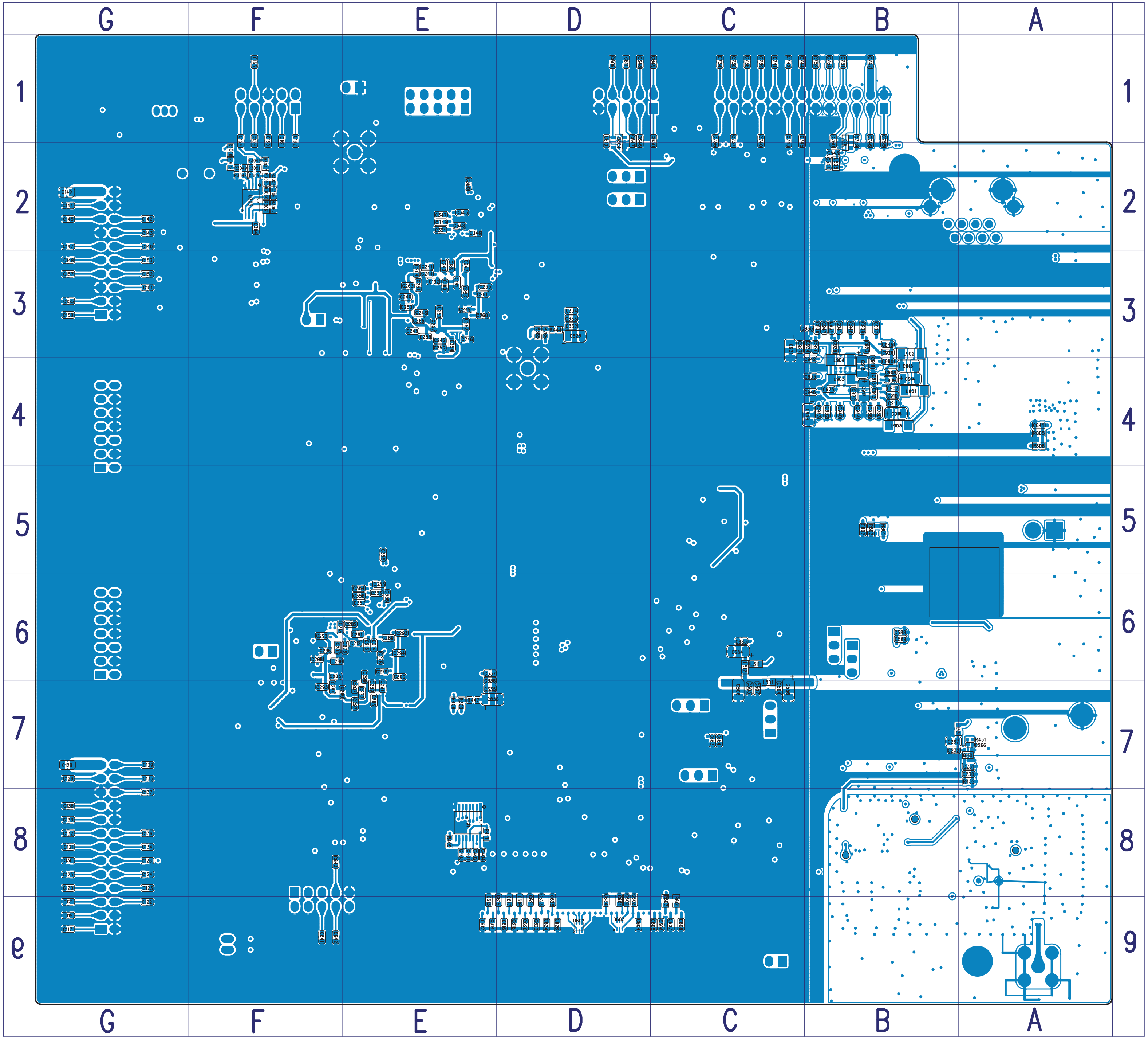
Figure 6-24 TCP/IP Block Diagram

6.3 PCB View

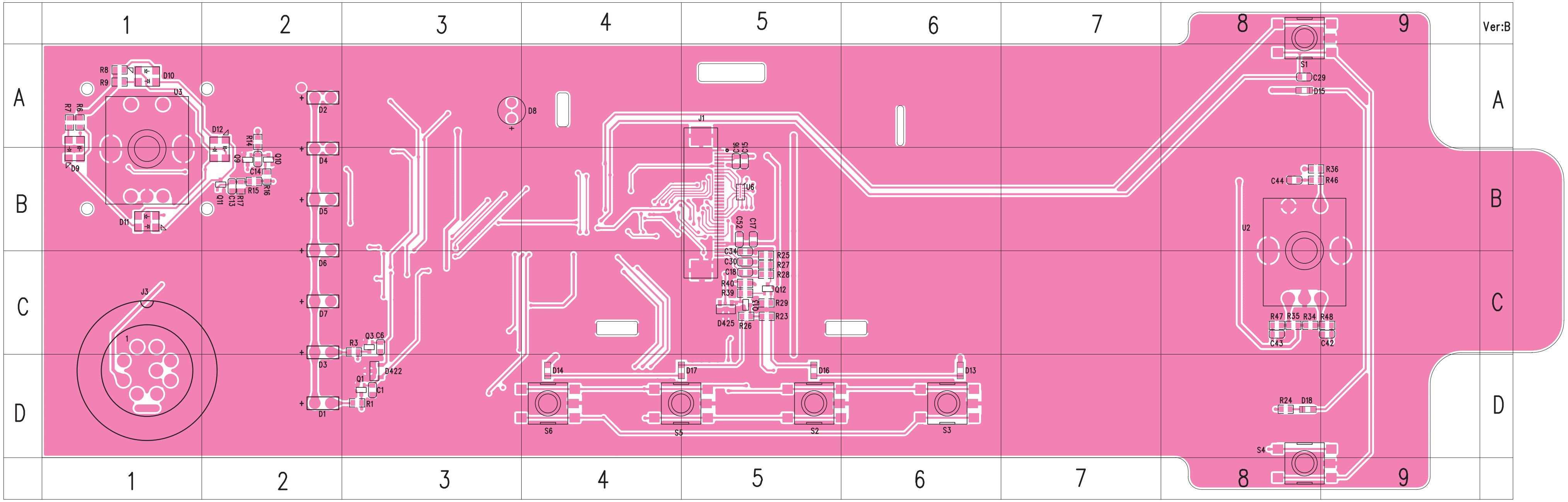
RD98X PCB View (Baseband Board)
Top Layer



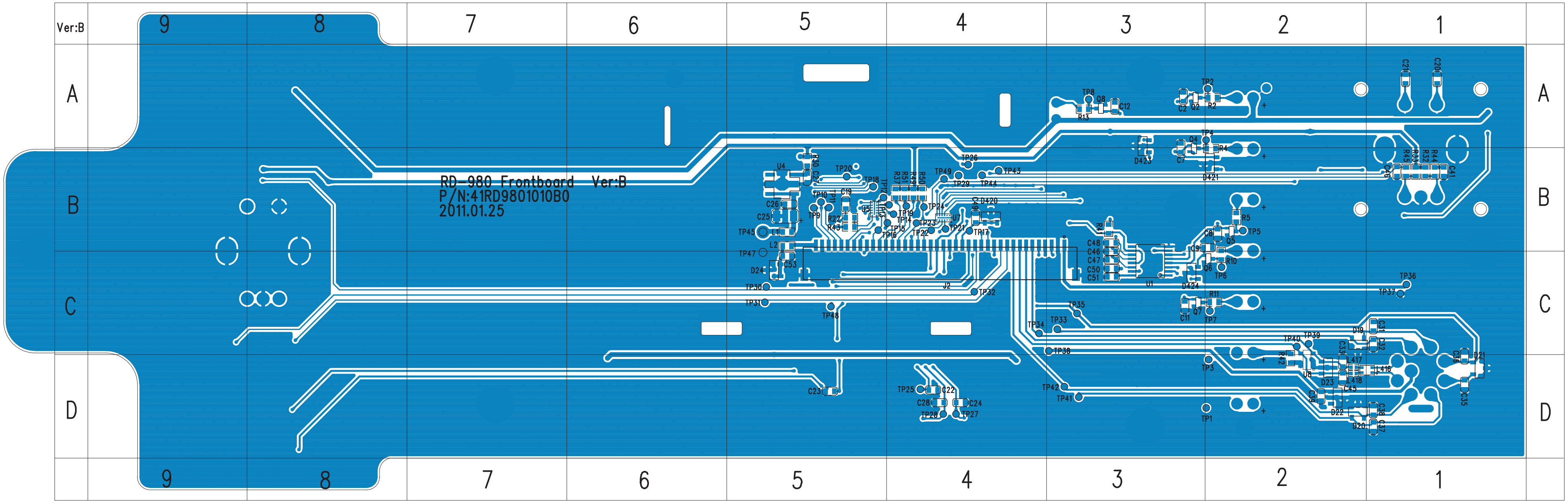
RD98X PCB View (Baseband Board)
Bottom Layer



RD98X PCB View (Front Panel)
Top Layer

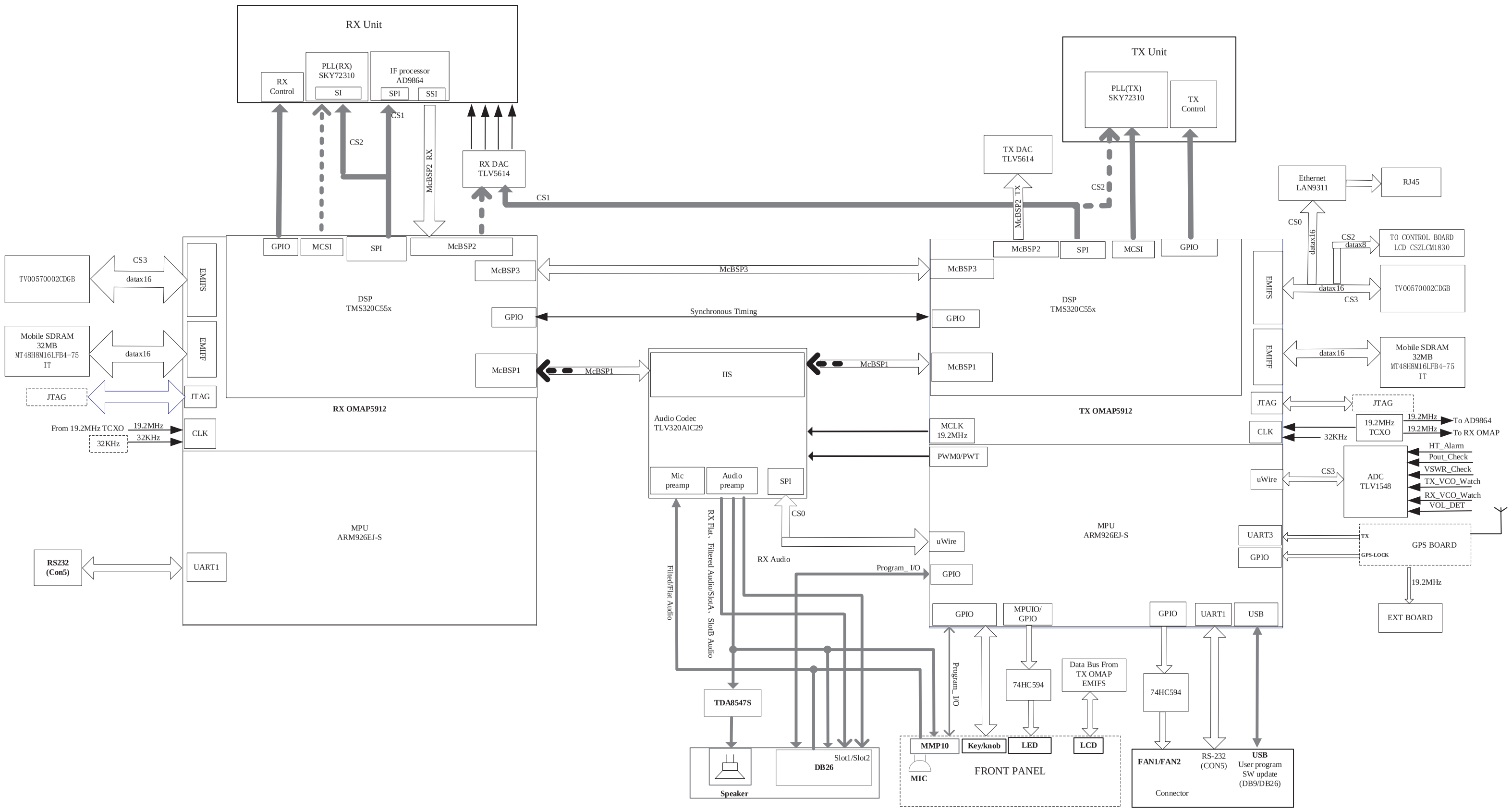


RD98X PCB View (Front Panel)
Bottom Layer

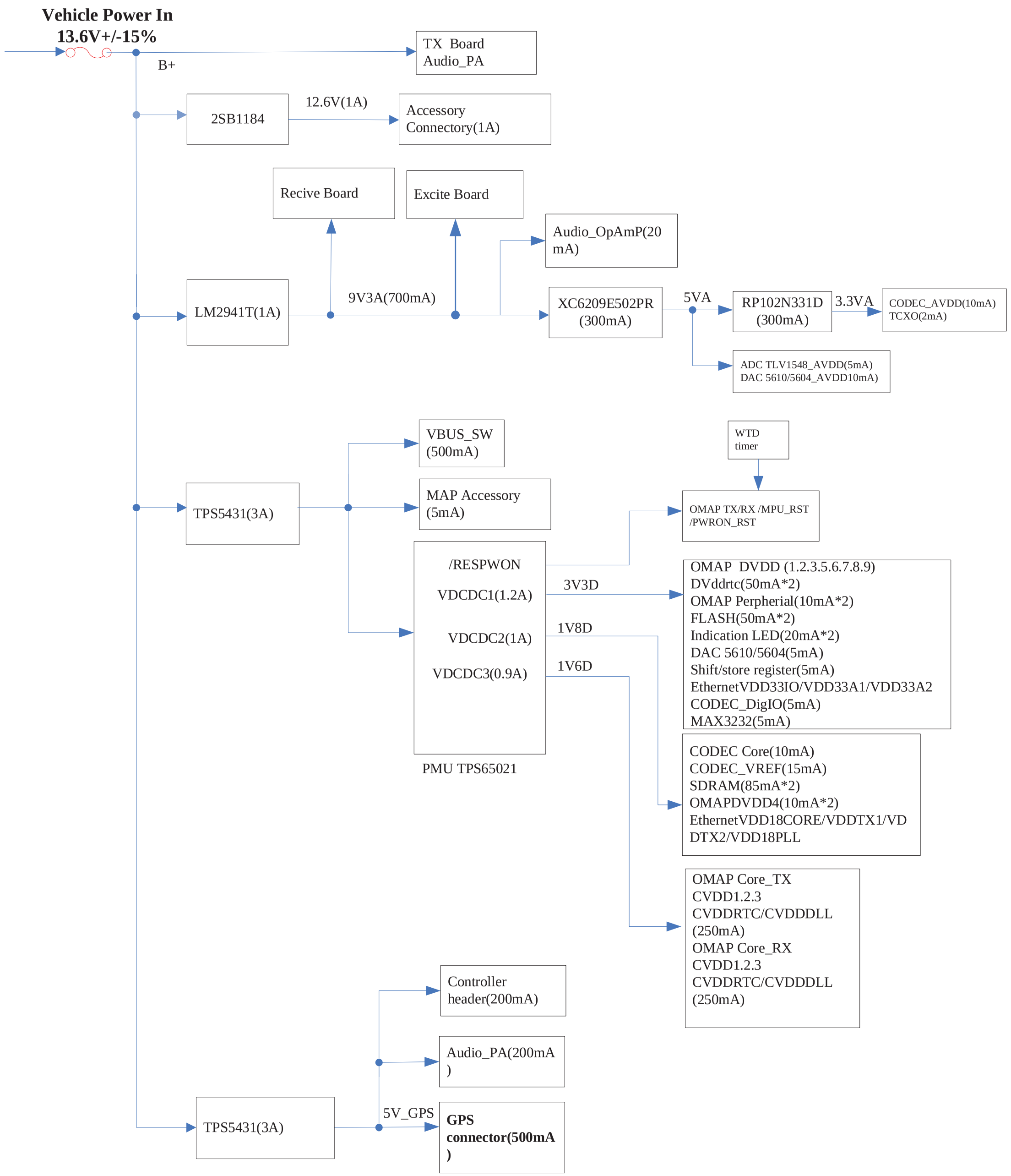


6.4 Block Diagram

RD98X Block Diagram (Baseband Section)

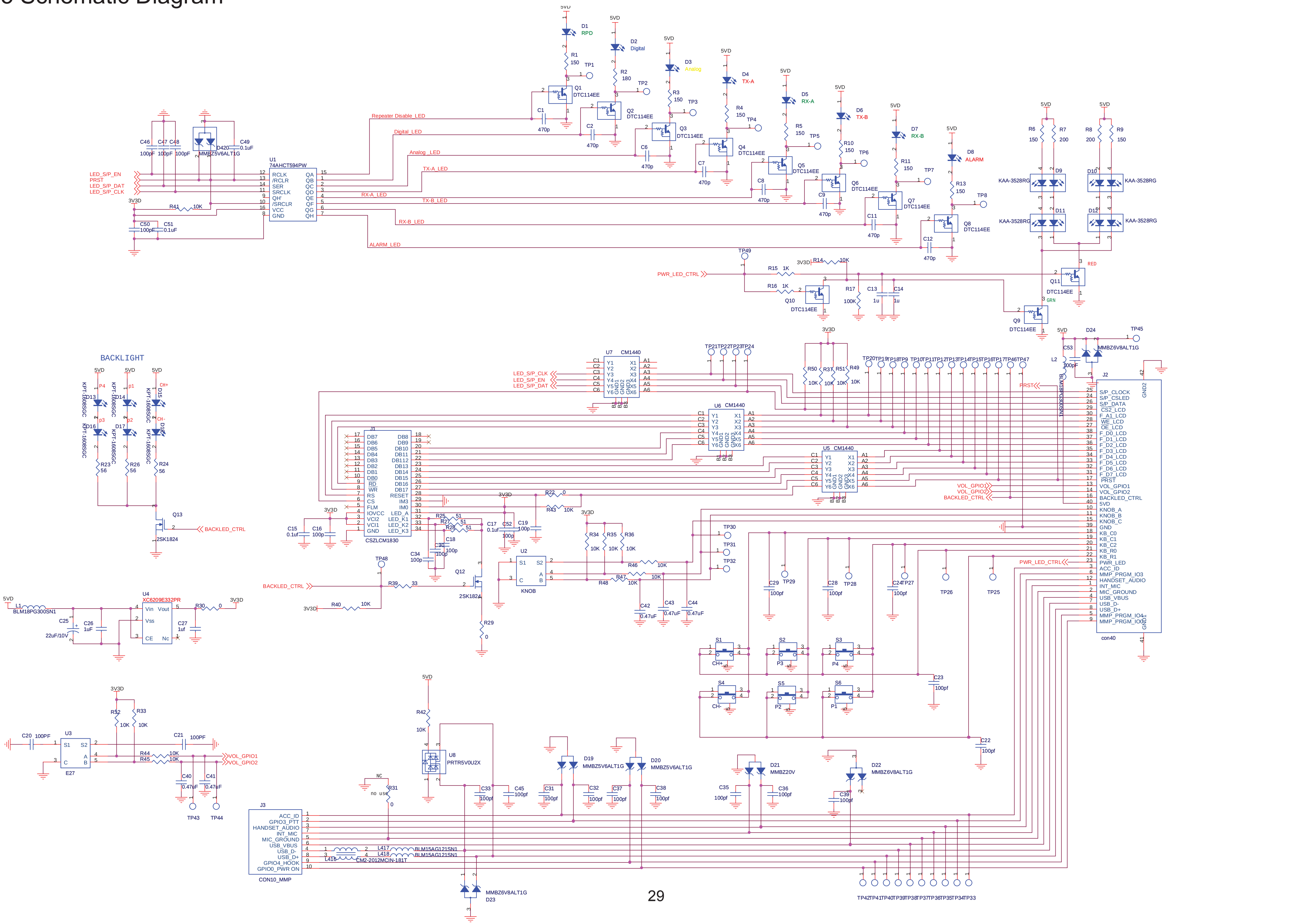


RD98X Block Diagram (Power Supply Section)

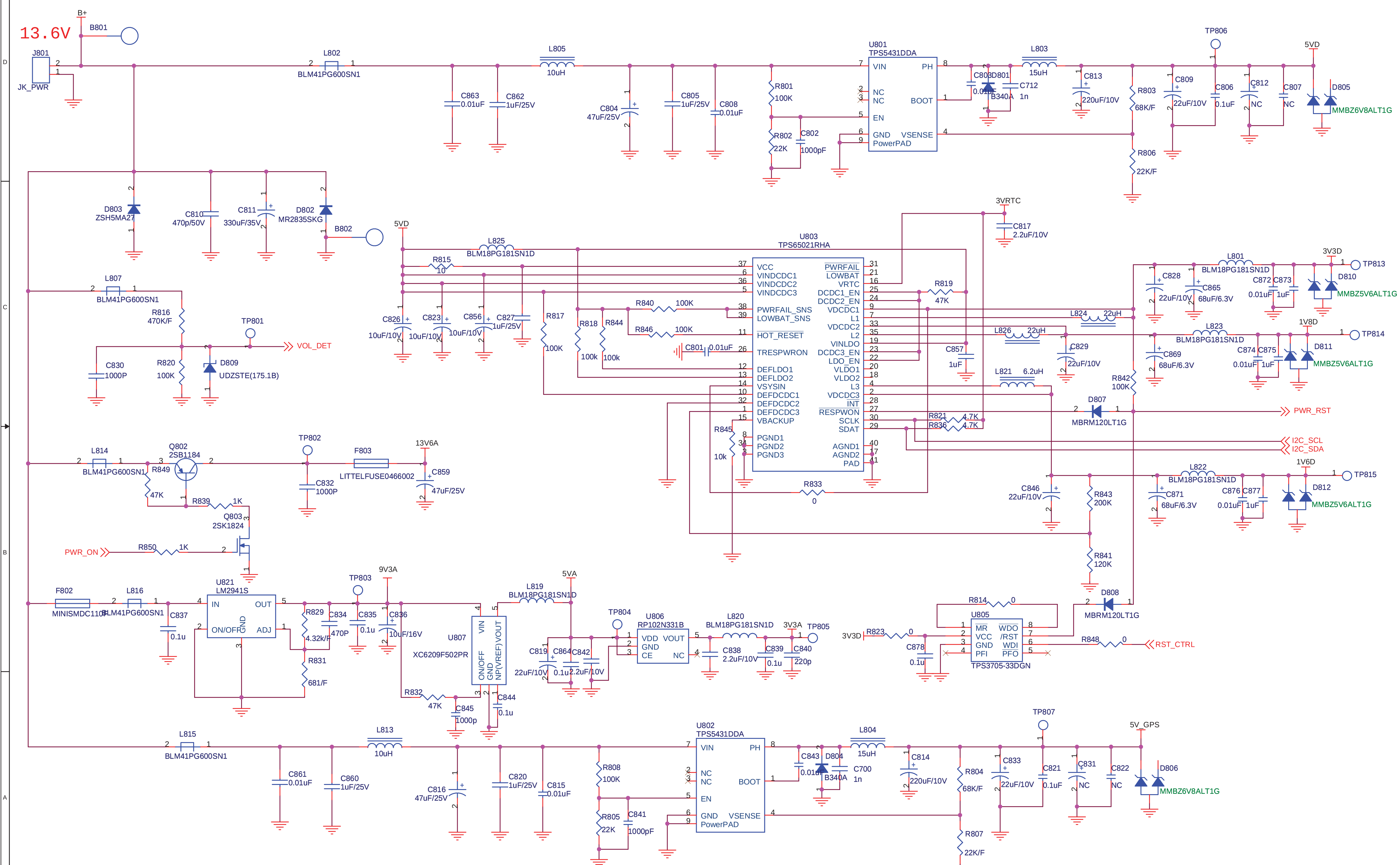


6.5 Schematic Diagram

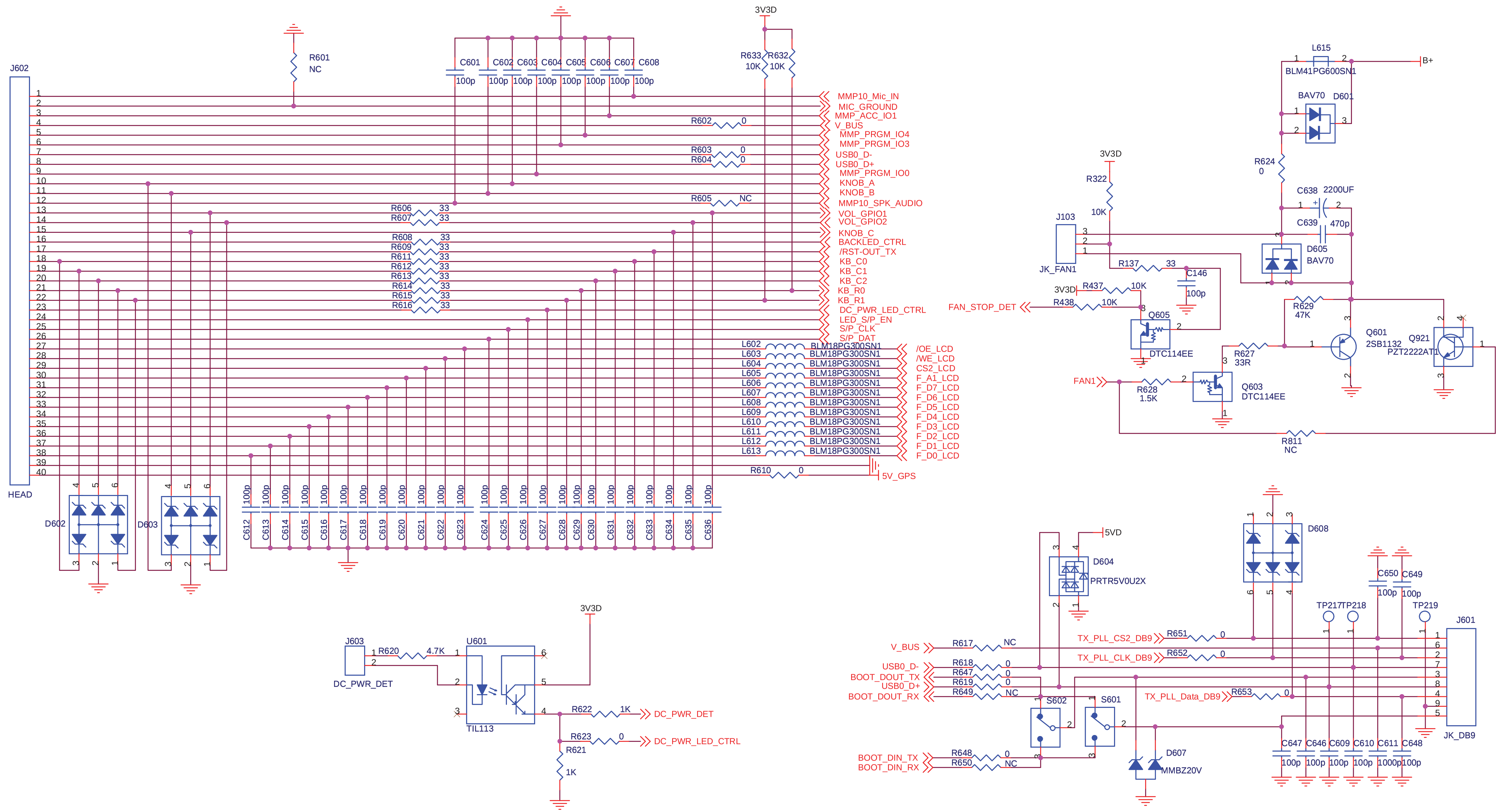
RD98X Schematic Diagram (Front Panel Circuit)



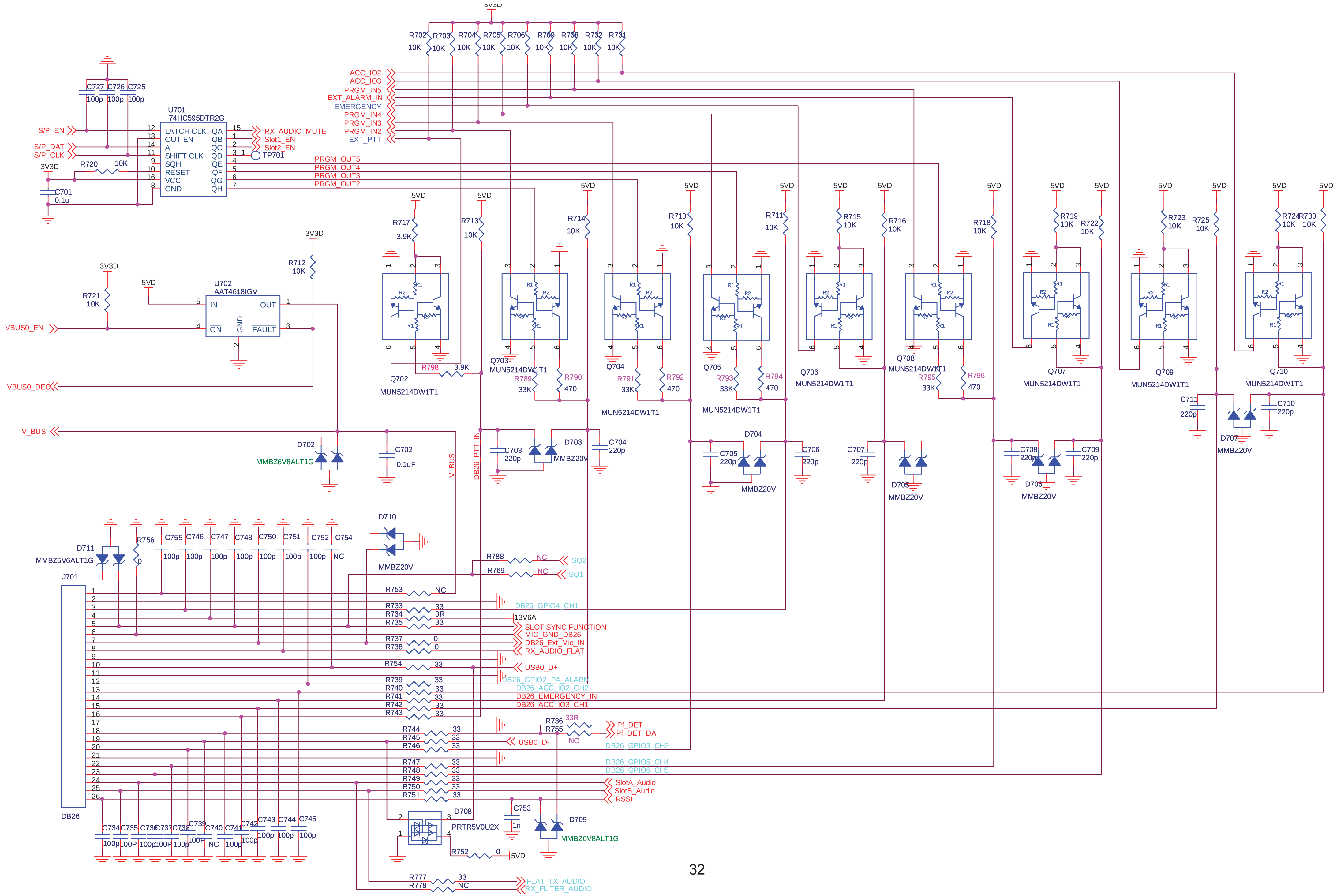
RD98X Schematic Diagram (Baseband_Power Supply Circuit)



RD98X Schematic Diagram (Baseband_Interface Circuit)

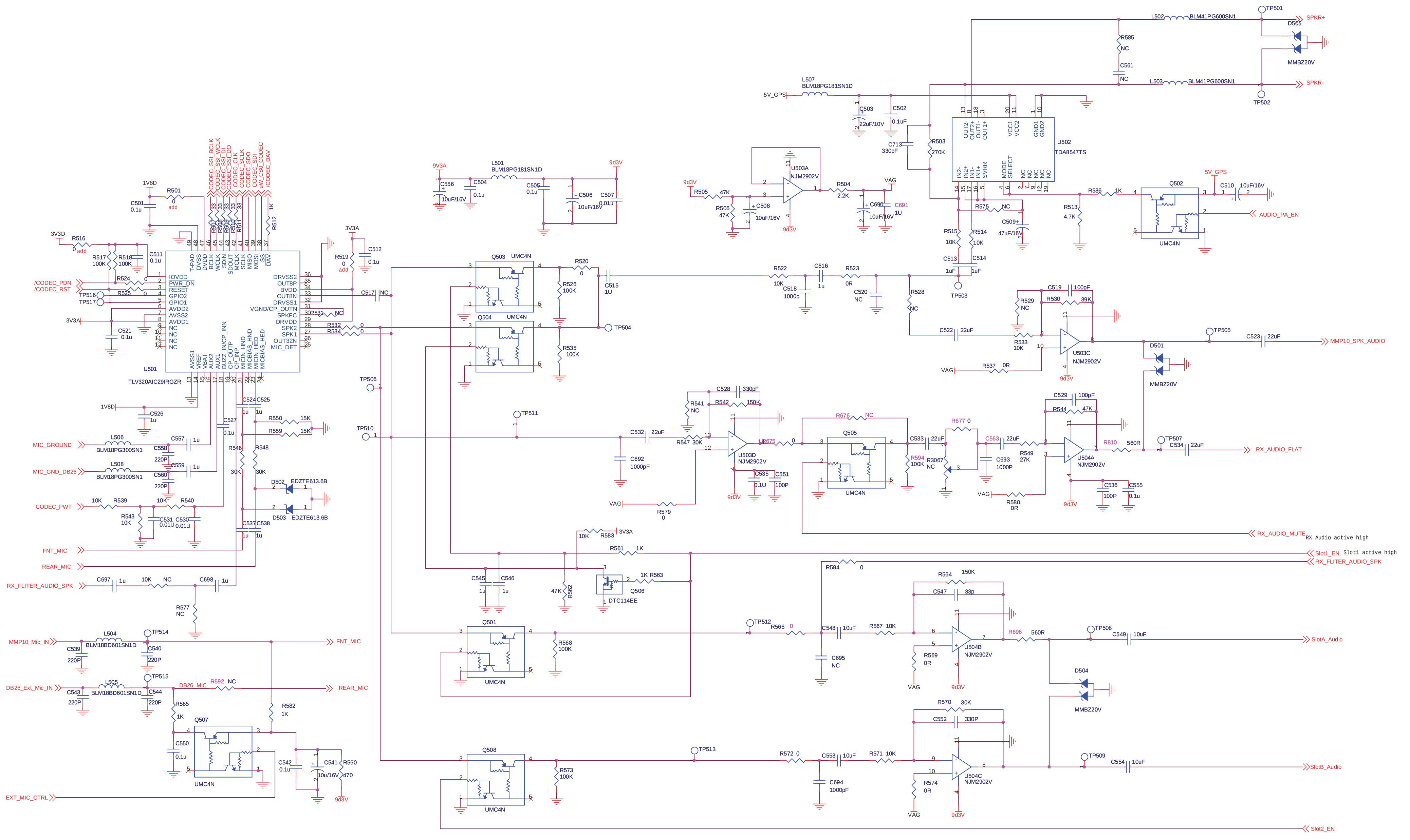


RD98X Schematic Diagram (Baseband_DB26 Interface Circuit)

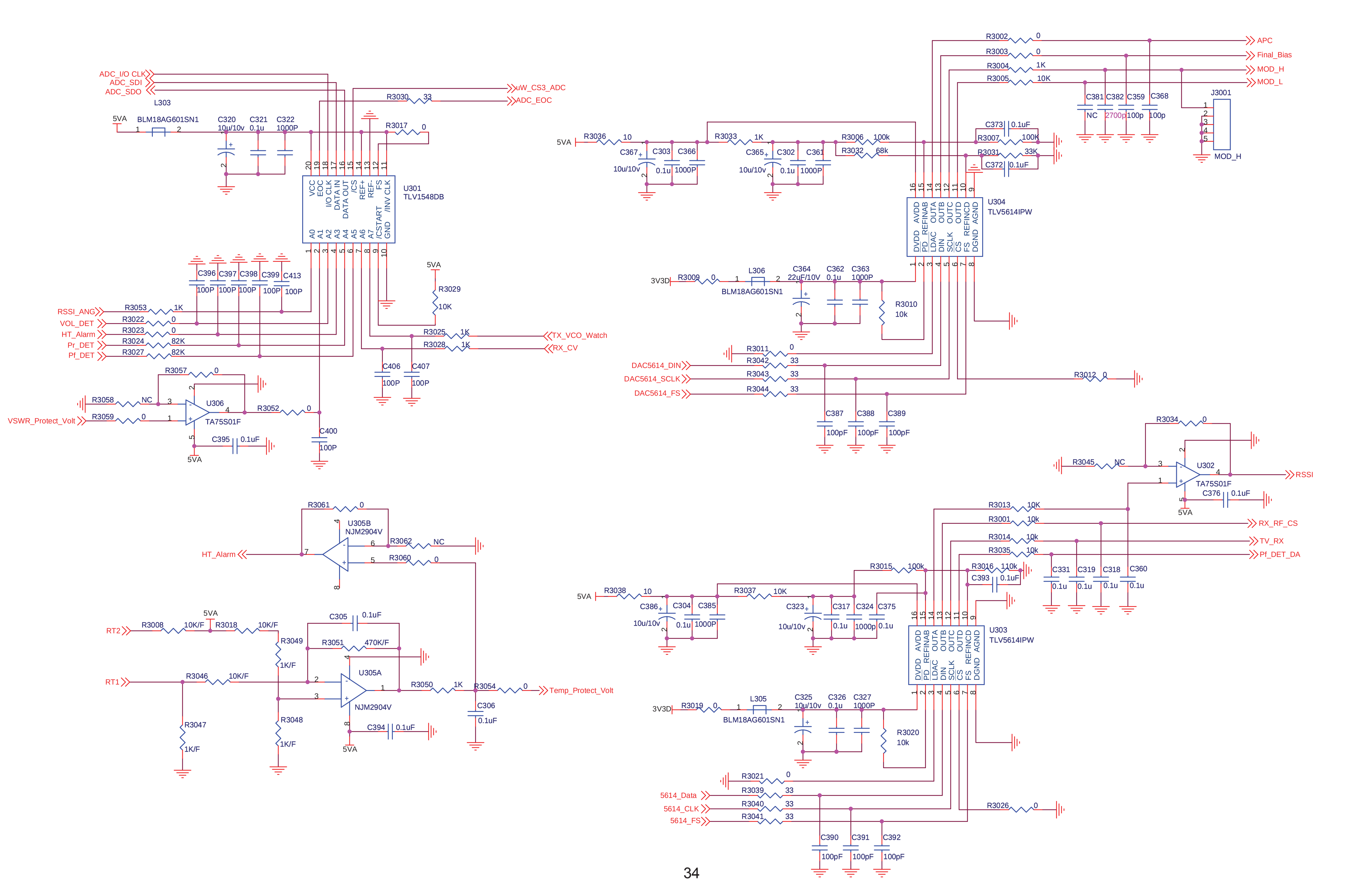


32

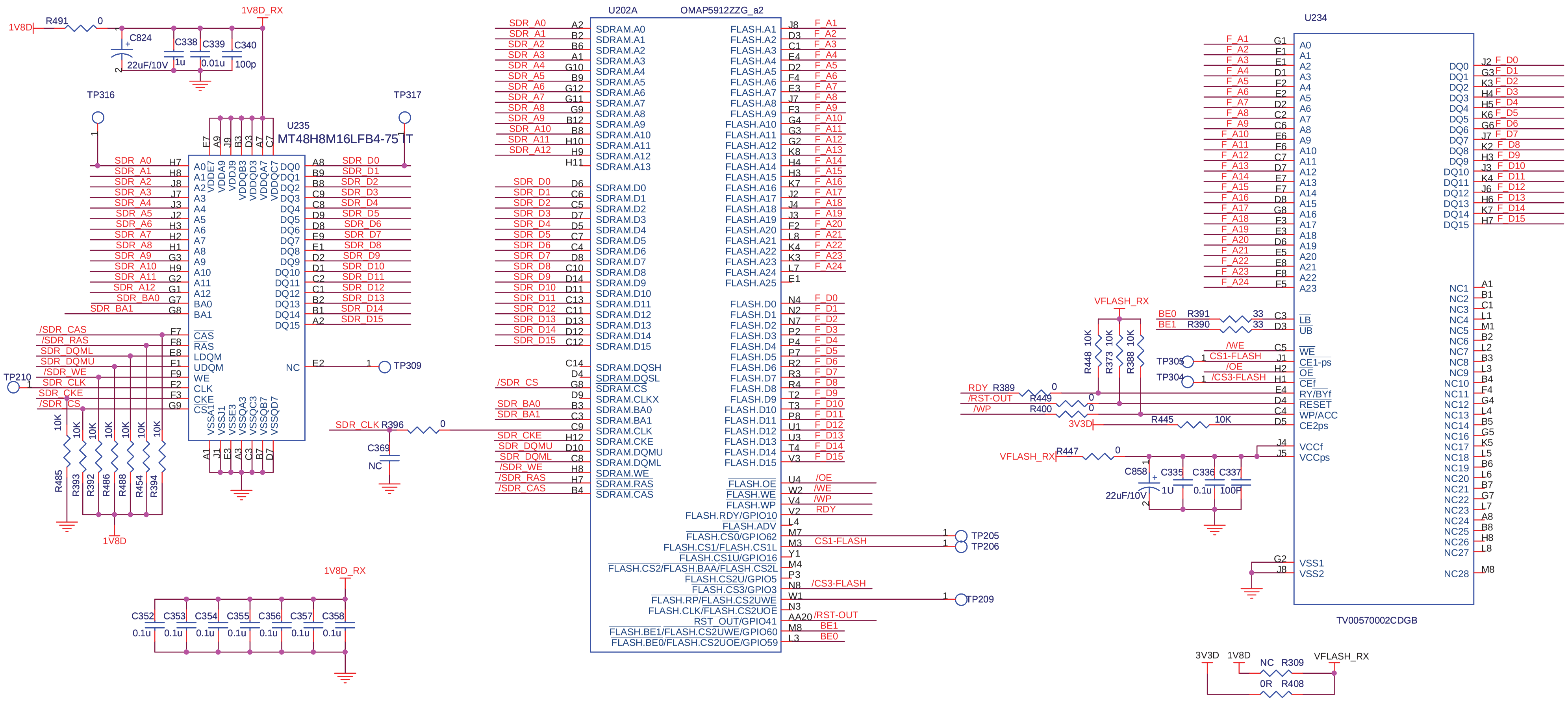
RD98X Schematic Diagram (Baseband_CODEC & Audio Amplifier Circuit)



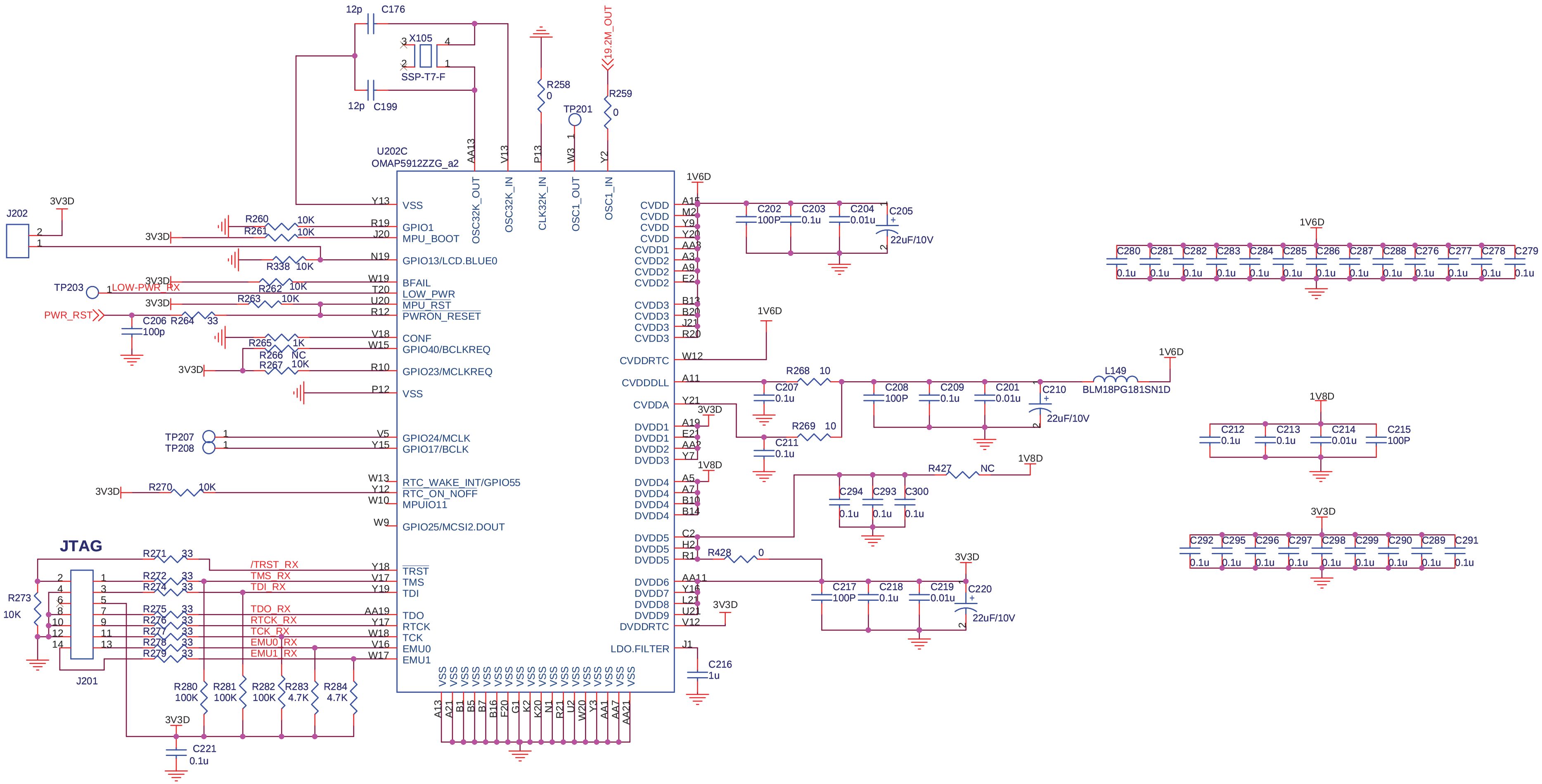
RD98X Schematic Diagram (Baseband_ADC & DAC Circuit)



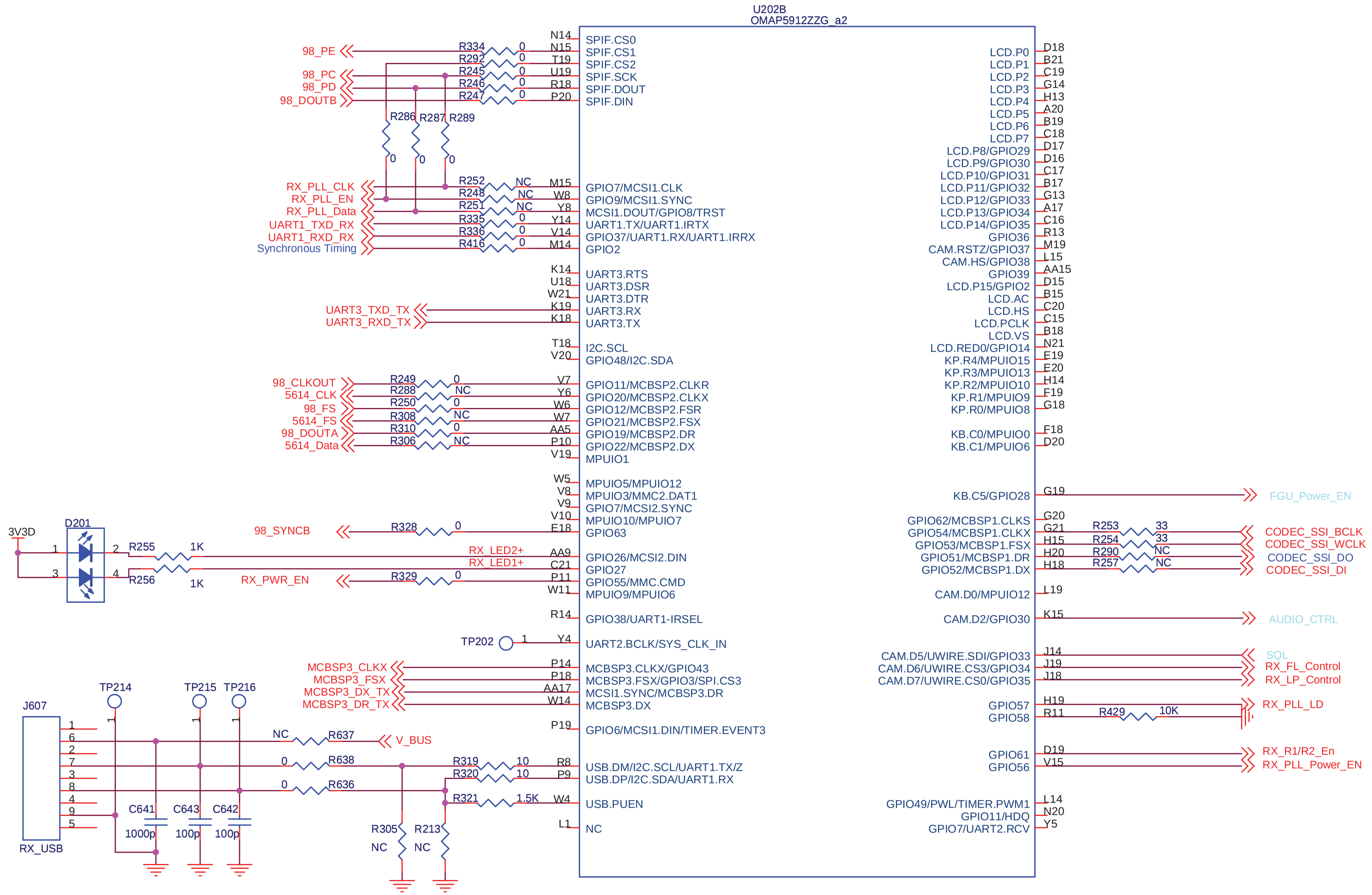
RD98X Schematic Diagram (Baseband_RX MEMORY Circuit)



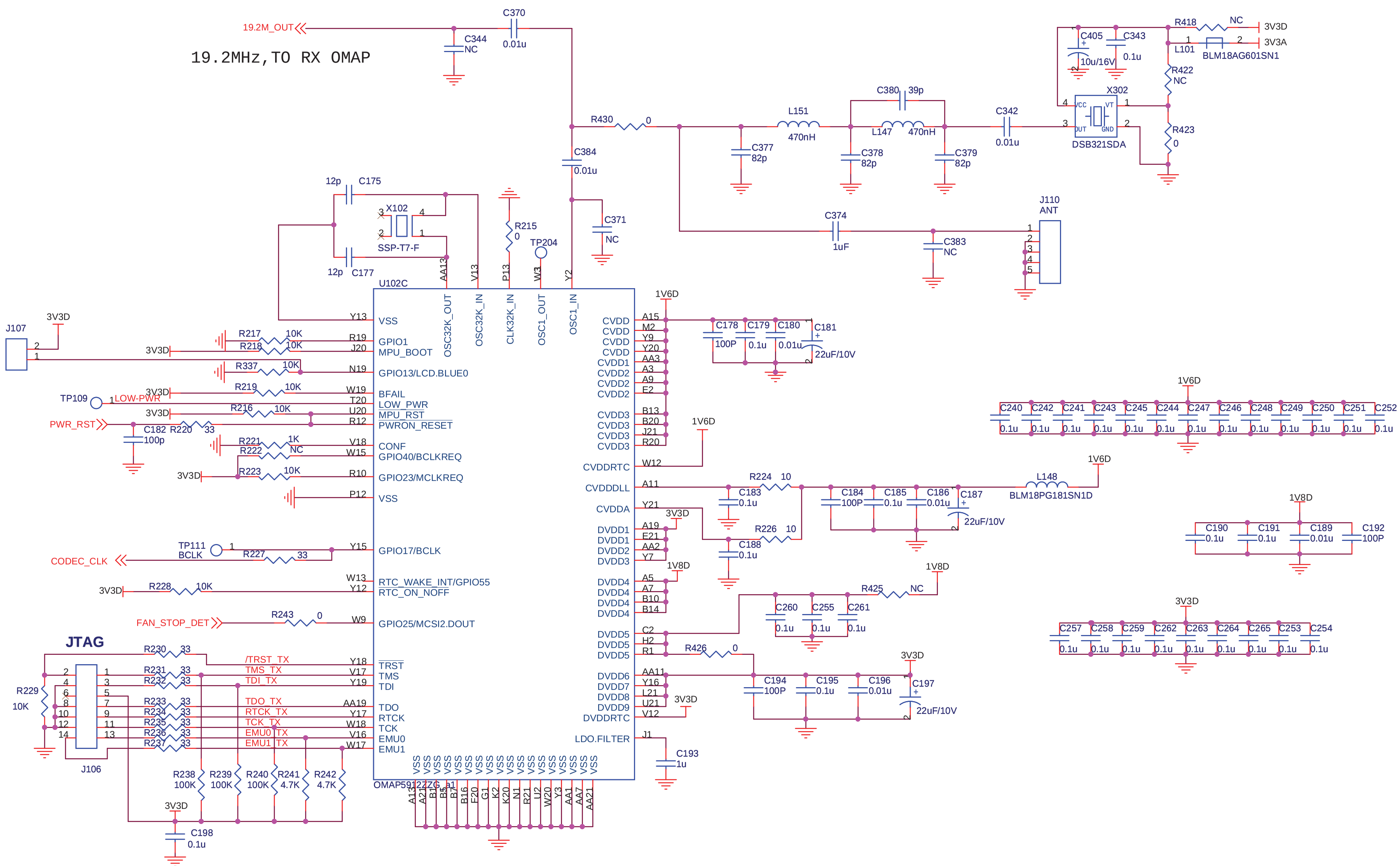
RD98X Schematic Diagram (Baseband_RX CORE Circuit)



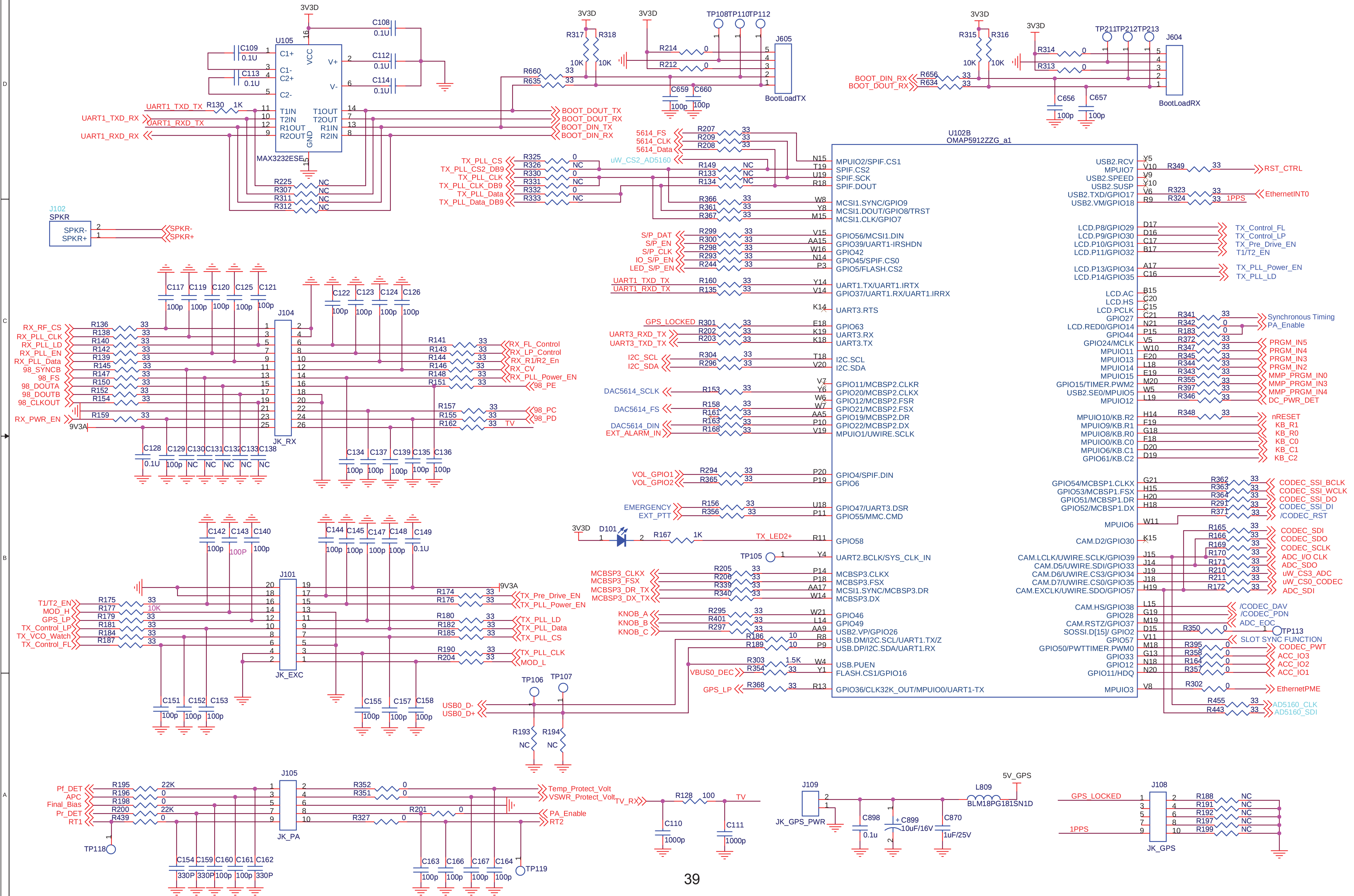
RD98X Schematic Diagram (Baseband_RX IO Circuit)



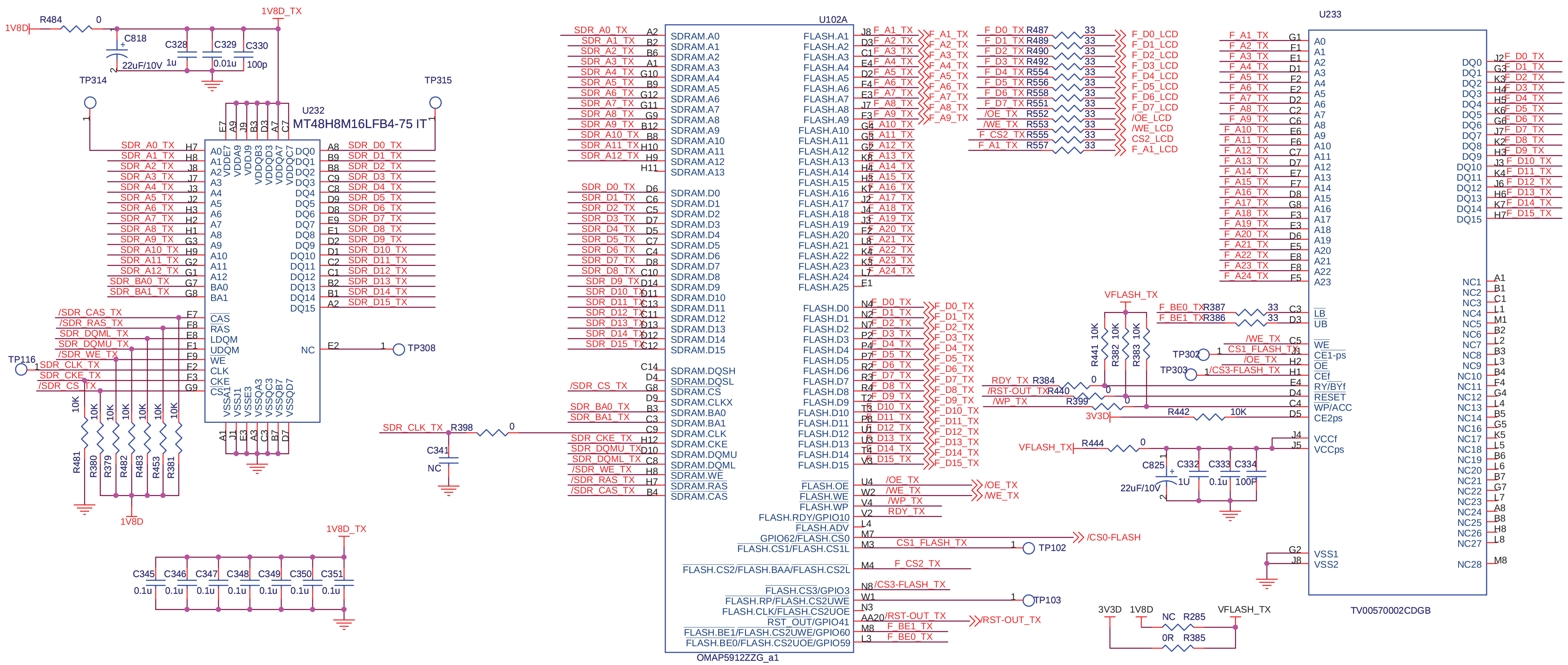
RD98X Schematic Diagram (Baseband_TX CORE Circuit)



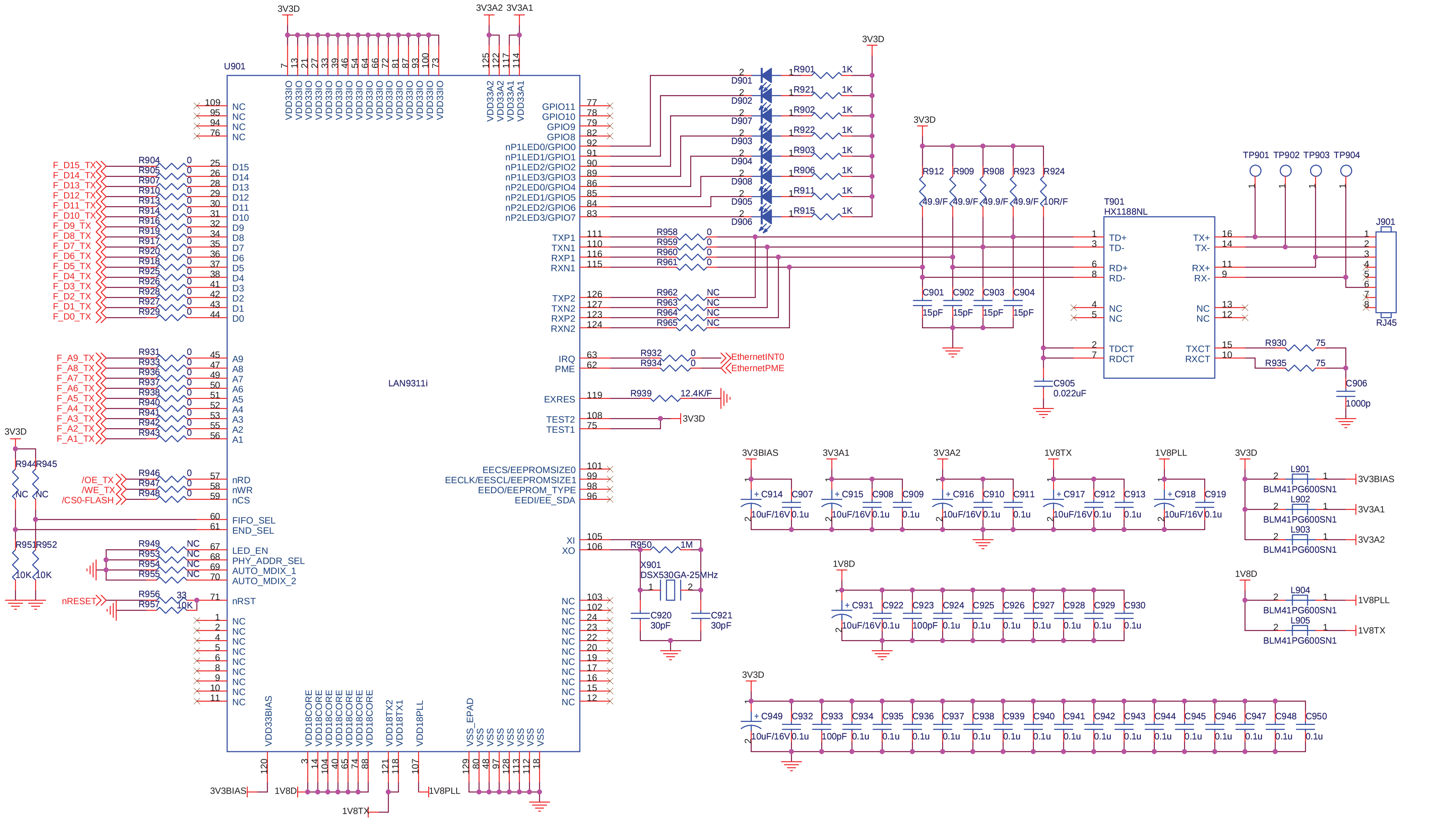
RD98X Schematic Diagram (Baseband_TX IO Circuit)



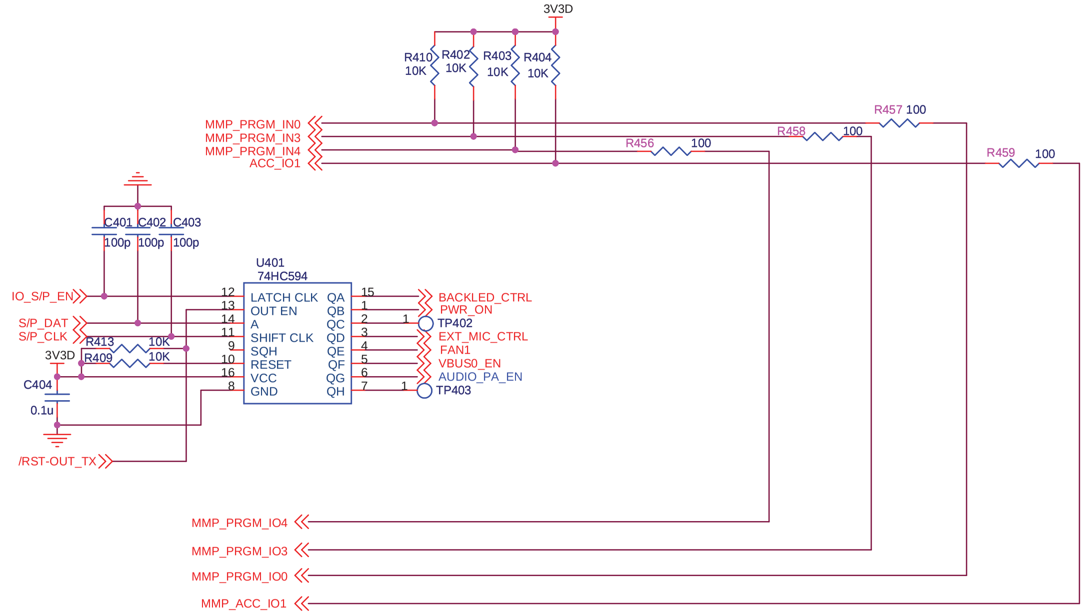
RD98X Schematic Diagram (Baseband_TX MEMORY Circuit)



RD98X Schematic Diagram (Baseband_Ethernet Circuit)



RD98X Schematic Diagram (Baseband_Interface Circuit)



6.6 Parts List

Baseband

No.	Ref. No.	Part No.	Description
1	C179	3101061040030	0.1UF
2	C183	3101061040030	0.1UF
3	C185	3101061040030	0.1UF
4	C188	3101061040030	0.1UF
5	C190	3101061040030	0.1UF
6	C191	3101061040030	0.1UF
7	C195	3101061040030	0.1UF
8	C198	3101061040030	0.1UF
9	C203	3101061040030	0.1UF
10	C207	3101061040030	0.1UF
11	C209	3101061040030	0.1UF
12	C211	3101061040030	0.1UF
13	C212	3101061040030	0.1UF
14	C213	3101061040030	0.1UF
15	C218	3101061040030	0.1UF
16	C221	3101061040030	0.1UF
17	C240	3101061040030	0.1UF
18	C241	3101061040030	0.1UF
19	C242	3101061040030	0.1UF
20	C243	3101061040030	0.1UF
21	C244	3101061040030	0.1UF
22	C245	3101061040030	0.1UF
23	C246	3101061040030	0.1UF
24	C247	3101061040030	0.1UF
25	C248	3101061040030	0.1UF
26	C249	3101061040030	0.1UF
27	C250	3101061040030	0.1UF
28	C251	3101061040030	0.1UF
29	C252	3101061040030	0.1UF
30	C253	3101061040030	0.1UF
31	C254	3101061040030	0.1UF
32	C255	3101061040030	0.1UF
33	C257	3101061040030	0.1UF
34	C258	3101061040030	0.1UF
35	C259	3101061040030	0.1UF
36	C260	3101061040030	0.1UF
37	C261	3101061040030	0.1UF
38	C262	3101061040030	0.1UF
39	C263	3101061040030	0.1UF

No.	Ref. No.	Part No.	Description
40	C264	3101061040030	0.1UF
41	C265	3101061040030	0.1UF
42	C276	3101061040030	0.1UF
43	C277	3101061040030	0.1UF
44	C278	3101061040030	0.1UF
45	C279	3101061040030	0.1UF
46	C280	3101061040030	0.1UF
47	C281	3101061040030	0.1UF
48	C282	3101061040030	0.1UF
49	C283	3101061040030	0.1UF
50	C284	3101061040030	0.1UF
51	C285	3101061040030	0.1UF
52	C286	3101061040030	0.1UF
53	C287	3101061040030	0.1UF
54	C288	3101061040030	0.1UF
55	C289	3101061040030	0.1UF
56	C290	3101061040030	0.1UF
57	C291	3101061040030	0.1UF
58	C292	3101061040030	0.1UF
59	C293	3101061040030	0.1UF
60	C294	3101061040030	0.1UF
61	C295	3101061040030	0.1UF
62	C296	3101061040030	0.1UF
63	C297	3101061040030	0.1UF
64	C298	3101061040030	0.1UF
65	C299	3101061040030	0.1UF
66	C300	3101061040030	0.1UF
67	C302	3101061040030	0.1UF
68	C303	3101061040030	0.1UF
69	C304	3101061040030	0.1UF
70	C305	3101061040030	0.1UF
71	C306	3101061040030	0.1UF
72	C317	3101061040030	0.1UF
73	C318	3101061040030	0.1UF
74	C319	3101061040030	0.1UF
75	C321	3101061040030	0.1UF
76	C326	3101061040030	0.1UF
77	C331	3101061040030	0.1UF
78	C333	3101061040030	0.1UF
79	C336	3101061040030	0.1UF
80	C343	3101061040030	0.1UF
81	C345	3101061040030	0.1UF

No.	Ref. No.	Part No.	Description
82	C346	3101061040030	0.1UF
83	C347	3101061040030	0.1UF
84	C348	3101061040030	0.1UF
85	C349	3101061040030	0.1UF
86	C350	3101061040030	0.1UF
87	C351	3101061040030	0.1UF
88	C352	3101061040030	0.1UF
89	C353	3101061040030	0.1UF
90	C354	3101061040030	0.1UF
91	C355	3101061040030	0.1UF
92	C356	3101061040030	0.1UF
93	C357	3101061040030	0.1UF
94	C358	3101061040030	0.1UF
95	C360	3101061040030	0.1UF
96	C362	3101061040030	0.1UF
97	C372	3101061040030	0.1UF
98	C373	3101061040030	0.1UF
99	C375	3101061040030	0.1UF
100	C376	3101061040030	0.1UF
101	C393	3101061040030	0.1UF
102	C394	3101061040030	0.1UF
103	C395	3101061040030	0.1UF
104	C404	3101061040030	0.1UF
105	C501	3101061040030	0.1UF
106	C502	3101061040030	0.1UF
107	C504	3101061040030	0.1UF
108	C505	3101061040030	0.1UF
109	C511	3101061040030	0.1UF
110	C512	3101061040030	0.1UF
111	C521	3101061040030	0.1UF
112	C527	3101061040030	0.1UF
113	C535	3101061040030	0.1UF
114	C542	3101061040030	0.1UF
115	C550	3101061040030	0.1UF
116	C555	3101061040030	0.1UF
117	C701	3101061040030	0.1UF
118	C702	3101061040030	0.1UF
119	C806	3101061040030	0.1UF
120	C821	3101061040030	0.1UF
121	C835	3101061040030	0.1UF
122	C837	3101061040030	0.1UF
123	C839	3101061040030	0.1UF

No.	Ref. No.	Part No.	Description
124	C844	3101061040030	0.1UF
125	C864	3101061040030	0.1UF
126	C878	3101061040030	0.1UF
127	C898	3101061040030	0.1UF
128	C907	3101061040030	0.1UF
129	C908	3101061040030	0.1UF
130	C909	3101061040030	0.1UF
131	C910	3101061040030	0.1UF
132	C911	3101061040030	0.1UF
133	C912	3101061040030	0.1UF
134	C913	3101061040030	0.1UF
135	C919	3101061040030	0.1UF
136	C922	3101061040030	0.1UF
137	C924	3101061040030	0.1UF
138	C925	3101061040030	0.1UF
139	C926	3101061040030	0.1UF
140	C927	3101061040030	0.1UF
141	C928	3101061040030	0.1UF
142	C929	3101061040030	0.1UF
143	C930	3101061040030	0.1UF
144	C932	3101061040030	0.1UF
145	C934	3101061040030	0.1UF
146	C935	3101061040030	0.1UF
147	C936	3101061040030	0.1UF
148	C937	3101061040030	0.1UF
149	C938	3101061040030	0.1UF
150	C939	3101061040030	0.1UF
151	C940	3101061040030	0.1UF
152	C941	3101061040030	0.1UF
153	C942	3101061040030	0.1UF
154	C943	3101061040030	0.1UF
155	C944	3101061040030	0.1UF
156	C945	3101061040030	0.1UF
157	C946	3101061040030	0.1UF
158	C947	3101061040030	0.1UF
159	C948	3101061040030	0.1UF
160	C950	3101061040030	0.1UF
161	C108	3101071040000	0.1UF
162	C109	3101071040000	0.1UF
163	C112	3101071040000	0.1UF
164	C113	3101071040000	0.1UF
165	C114	3101071040000	0.1UF

No.	Ref. No.	Part No.	Description
166	C128	3101071040000	0.1UF
167	C149	3101071040000	0.1UF
168	C110	3101061020000	1000PF
169	C111	3101061020000	1000PF
170	C322	3101061020000	1000PF
171	C324	3101061020000	1000PF
172	C327	3101061020000	1000PF
173	C361	3101061020000	1000PF
174	C363	3101061020000	1000PF
175	C366	3101061020000	1000PF
176	C385	3101061020000	1000PF
177	C518	3101061020000	1000PF
178	C611	3101061020000	1000PF
179	C641	3101061020000	1000PF
180	C700	3101061020000	1000PF
181	C712	3101061020000	1000PF
182	C753	3101061020000	1000PF
183	C802	3101061020000	1000PF
184	C830	3101061020000	1000PF
185	C832	3101061020000	1000PF
186	C841	3101061020000	1000PF
187	C845	3101061020000	1000PF
188	C906	3101061020000	1000PF
189	C117	3101061010010	100PF
190	C119	3101061010010	100PF
191	C120	3101061010010	100PF
192	C121	3101061010010	100PF
193	C122	3101061010010	100PF
194	C123	3101061010010	100PF
195	C124	3101061010010	100PF
196	C125	3101061010010	100PF
197	C126	3101061010010	100PF
198	C129	3101061010010	100PF
199	C134	3101061010010	100PF
200	C135	3101061010010	100PF
201	C136	3101061010010	100PF
202	C137	3101061010010	100PF
203	C139	3101061010010	100PF
204	C140	3101061010010	100PF
205	C142	3101061010010	100PF
206	C143	3101061010010	100PF
207	C144	3101061010010	100PF

No.	Ref. No.	Part No.	Description
208	C145	3101061010010	100PF
209	C146	3101061010010	100PF
210	C147	3101061010010	100PF
211	C148	3101061010010	100PF
212	C151	3101061010010	100PF
213	C152	3101061010010	100PF
214	C153	3101061010010	100PF
215	C154	3101061010010	100PF
216	C155	3101061010010	100PF
217	C157	3101061010010	100PF
218	C158	3101061010010	100PF
219	C159	3101061010010	100PF
220	C160	3101061010010	100PF
221	C161	3101061010010	100PF
222	C162	3101061010010	100PF
223	C163	3101061010010	100PF
224	C164	3101061010010	100PF
225	C166	3101061010010	100PF
226	C167	3101061010010	100PF
227	C178	3101061010010	100PF
228	C182	3101061010010	100PF
229	C184	3101061010010	100PF
230	C192	3101061010010	100PF
231	C194	3101061010010	100PF
232	C202	3101061010010	100PF
233	C206	3101061010010	100PF
234	C208	3101061010010	100PF
235	C215	3101061010010	100PF
236	C217	3101061010010	100PF
237	C330	3101061010010	100PF
238	C334	3101061010010	100PF
239	C337	3101061010010	100PF
240	C340	3101061010010	100PF
241	C359	3101061010010	100PF
242	C368	3101061010010	100PF
243	C387	3101061010010	100PF
244	C388	3101061010010	100PF
245	C389	3101061010010	100PF
246	C390	3101061010010	100PF
247	C391	3101061010010	100PF
248	C392	3101061010010	100PF
249	C401	3101061010010	100PF

No.	Ref. No.	Part No.	Description
250	C402	3101061010010	100PF
251	C403	3101061010010	100PF
252	C519	3101061010010	100PF
253	C529	3101061010010	100PF
254	C536	3101061010010	100PF
255	C551	3101061010010	100PF
256	C601	3101061010010	100PF
257	C602	3101061010010	100PF
258	C603	3101061010010	100PF
259	C604	3101061010010	100PF
260	C605	3101061010010	100PF
261	C606	3101061010010	100PF
262	C607	3101061010010	100PF
263	C608	3101061010010	100PF
264	C612	3101061010010	100PF
265	C613	3101061010010	100PF
266	C614	3101061010010	100PF
267	C615	3101061010010	100PF
268	C616	3101061010010	100PF
269	C617	3101061010010	100PF
270	C618	3101061010010	100PF
271	C619	3101061010010	100PF
272	C620	3101061010010	100PF
273	C621	3101061010010	100PF
274	C622	3101061010010	100PF
275	C623	3101061010010	100PF
276	C624	3101061010010	100PF
277	C625	3101061010010	100PF
278	C626	3101061010010	100PF
279	C627	3101061010010	100PF
280	C628	3101061010010	100PF
281	C629	3101061010010	100PF
282	C630	3101061010010	100PF
283	C631	3101061010010	100PF
284	C632	3101061010010	100PF
285	C633	3101061010010	100PF
286	C634	3101061010010	100PF
287	C635	3101061010010	100PF
288	C636	3101061010010	100PF
289	C642	3101061010010	100PF
290	C643	3101061010010	100PF
291	C646	3101061010010	100PF

No.	Ref. No.	Part No.	Description
292	C647	3101061010010	100PF
293	C648	3101061010010	100PF
294	C649	3101061010010	100PF
295	C650	3101061010010	100PF
296	C656	3101061010010	100PF
297	C657	3101061010010	100PF
298	C659	3101061010010	100PF
299	C660	3101061010010	100PF
300	C725	3101061010010	100PF
301	C726	3101061010010	100PF
302	C727	3101061010010	100PF
303	C734	3101061010010	100PF
304	C735	3101061010010	100PF
305	C736	3101061010010	100PF
306	C737	3101061010010	100PF
307	C738	3101061010010	100PF
308	C739	3101061010010	100PF
309	C741	3101061010010	100PF
310	C742	3101061010010	100PF
311	C743	3101061010010	100PF
312	C744	3101061010010	100PF
313	C745	3101061010010	100PF
314	C746	3101061010010	100PF
315	C747	3101061010010	100PF
316	C748	3101061010010	100PF
317	C750	3101061010010	100PF
318	C752	3101061010010	100PF
319	C755	3101061010010	100PF
320	C923	3101061010010	100PF
321	C933	3101061010010	100PF
322	C751	3101071010000	100PF
323	C175	3101061200000	12PF
324	C176	3101061200000	12PF
325	C177	3101061200000	12PF
326	C199	3101061200000	12PF
327	C180	3101061030010	0.01UF
328	C186	3101061030010	0.01UF
329	C189	3101061030010	0.01UF
330	C196	3101061030010	0.01UF
331	C201	3101061030010	0.01UF
332	C204	3101061030010	0.01UF
333	C214	3101061030010	0.01UF

No.	Ref. No.	Part No.	Description
334	C219	3101061030010	0.01UF
335	C329	3101061030010	0.01UF
336	C339	3101061030010	0.01UF
337	C342	3101061030010	0.01UF
338	C370	3101061030010	0.01UF
339	C384	3101061030010	0.01UF
340	C507	3101061030010	0.01UF
341	C530	3101061030010	0.01UF
342	C531	3101061030010	0.01UF
343	C801	3101061030010	0.01UF
344	C803	3101061030010	0.01UF
345	C808	3101061030010	0.01UF
346	C815	3101061030010	0.01UF
347	C843	3101061030010	0.01UF
348	C861	3101061030010	0.01UF
349	C863	3101061030010	0.01UF
350	C872	3101061030010	0.01UF
351	C874	3101061030010	0.01UF
352	C876	3101061030010	0.01UF
353	C181	3104082260060	22UF
354	C187	3104082260060	22UF
355	C197	3104082260060	22UF
356	C205	3104082260060	22UF
357	C210	3104082260060	22UF
358	C220	3104082260060	22UF
359	C364	3104082260060	22UF
360	C503	3104082260060	22UF
361	C809	3104082260060	22UF
362	C818	3104082260060	22UF
363	C819	3104082260060	22UF
364	C824	3104082260060	22UF
365	C825	3104082260060	22UF
366	C828	3104082260060	22UF
367	C829	3104082260060	22UF
368	C833	3104082260060	22UF
369	C846	3104082260060	22UF
370	C858	3104082260060	22UF
371	C193	3101061050000	1UF
372	C216	3101061050000	1UF
373	C328	3101061050000	1UF
374	C332	3101061050000	1UF
375	C335	3101061050000	1UF

No.	Ref. No.	Part No.	Description
376	C338	3101061050000	1UF
377	C374	3101061050000	1UF
378	C513	3101061050000	1UF
379	C514	3101061050000	1UF
380	C515	3101061050000	1UF
381	C516	3101061050000	1UF
382	C524	3101061050000	1UF
383	C525	3101061050000	1UF
384	C526	3101061050000	1UF
385	C537	3101061050000	1UF
386	C538	3101061050000	1UF
387	C545	3101061050000	1UF
388	C546	3101061050000	1UF
389	C557	3101061050000	1UF
390	C559	3101061050000	1UF
391	C691	3101061050000	1UF
392	C805	3101061050000	1UF
393	C820	3101061050000	1UF
394	C827	3101061050000	1UF
395	C857	3101061050000	1UF
396	C860	3101061050000	1UF
397	C862	3101061050000	1UF
398	C870	3101061050000	1UF
399	C873	3101061050000	1UF
400	C875	3101061050000	1UF
401	C877	3101061050000	1UF
402	C320	3104071060070	10UF
403	C323	3104071060070	10UF
404	C325	3104071060070	10UF
405	C365	3104071060070	10UF
406	C367	3104071060070	10UF
407	C386	3104071060070	10UF
408	C823	3104071060070	10UF
409	C826	3104071060070	10UF
410	C856	3104071060070	10UF
411	C377	3101068200000	82PF
412	C378	3101068200000	82PF
413	C379	3101068200000	82PF
414	C380	3101063900000	39PF
415	C405	3104081060120	10UF
416	C506	3104081060120	10UF
417	C508	3104081060120	10UF

No.	Ref. No.	Part No.	Description
418	C510	3104081060120	10UF
419	C541	3104081060120	10UF
420	C556	3104081060120	10UF
421	C836	3104081060120	10UF
422	C899	3104081060120	10UF
423	C914	3104081060120	10UF
424	C915	3104081060120	10UF
425	C916	3104081060120	10UF
426	C917	3104081060120	10UF
427	C918	3104081060120	10UF
428	C931	3104081060120	10UF
429	C949	3104081060120	10UF
430	C509	3104274760000	47UF
431	C522	3101082260020	22UF
432	C523	3101082260020	22UF
433	C532	3101082260020	22UF
434	C533	3101082260020	22UF
435	C534	3101082260020	22UF
436	C563	3101082260020	22UF
437	C539	3101062210000	220PF
438	C540	3101062210000	220PF
439	C543	3101062210000	220PF
440	C544	3101062210000	220PF
441	C558	3101062210000	220PF
442	C560	3101062210000	220PF
443	C703	3101062210000	220PF
444	C704	3101062210000	220PF
445	C705	3101062210000	220PF
446	C706	3101062210000	220PF
447	C707	3101062210000	220PF
448	C708	3101062210000	220PF
449	C709	3101062210000	220PF
450	C710	3101062210000	220PF
451	C711	3101062210000	220PF
452	C840	3101062210000	220PF
453	C552	3101063310010	330PF
454	C528	3101063300000	33PF
455	C547	3101063300000	33PF
456	C548	3101081060010	10UF
457	C549	3101081060010	10UF
458	C553	3101081060010	10UF
459	C554	3101081060010	10UF

No.	Ref. No.	Part No.	Description
460	C639	3101064710000	2700PF
461	C810	3101064710000	2700PF
462	C834	3101064710000	2700PF
463	C817	3101062250000	2.2UF
464	C838	3101062250000	2.2UF
465	C842	3101062250000	2.2UF
466	C901	3101061500010	15PF
467	C902	3101061500010	15PF
468	C903	3101061500010	15PF
469	C904	3101061500010	15PF
470	C905	3101072230000	0.022UF
471	C920	3101063000010	30PF
472	C921	3101063000010	30PF
473	C813	3110992270000	220UF
474	R128	3001061010000	100Ω
475	R456	3001061010000	100Ω
476	R457	3001061010000	100Ω
477	R458	3001061010000	100Ω
478	R459	3001061010000	100Ω
479	R734	3001061010000	100Ω
480	R130	3001061020010	1KΩ
481	R167	3001061020010	1KΩ
482	R221	3001061020010	1KΩ
483	R255	3001061020010	1KΩ
484	R256	3001061020010	1KΩ
485	R265	3001061020010	1KΩ
486	R3004	3001061020010	1KΩ
487	R3025	3001061020010	1KΩ
488	R3028	3001061020010	1KΩ
489	R3033	3001061020010	1KΩ
490	R512	3001061020010	1KΩ
491	R561	3001061020010	1KΩ
492	R563	3001061020010	1KΩ
493	R565	3001061020010	1KΩ
494	R582	3001061020010	1KΩ
495	R586	3001061020010	1KΩ
496	R621	3001061020010	1KΩ
497	R622	3001061020010	1KΩ
498	R839	3001061020010	1KΩ
499	R850	3001061020010	1KΩ
500	R901	3001061020010	1KΩ
501	R902	3001061020010	1KΩ

No.	Ref. No.	Part No.	Description
502	R903	3001061020010	1KΩ
503	R906	3001061020010	1KΩ
504	R911	3001061020010	1KΩ
505	R915	3001061020010	1KΩ
506	R921	3001061020010	1KΩ
507	R922	3001061020010	1KΩ
508	R3047	3001061020000	1KΩ
509	R3048	3001061020000	1KΩ
510	R3049	3001061020000	1KΩ
511	R3050	3001061020000	1KΩ
512	R135	3001063300000	33Ω
513	R136	3001063300000	33Ω
514	R137	3001063300000	33Ω
515	R138	3001063300000	33Ω
516	R139	3001063300000	33Ω
517	R140	3001063300000	33Ω
518	R141	3001063300000	33Ω
519	R142	3001063300000	33Ω
520	R143	3001063300000	33Ω
521	R144	3001063300000	33Ω
522	R145	3001063300000	33Ω
523	R146	3001063300000	33Ω
524	R147	3001063300000	33Ω
525	R148	3001063300000	33Ω
526	R150	3001063300000	33Ω
527	R151	3001063300000	33Ω
528	R152	3001063300000	33Ω
529	R153	3001063300000	33Ω
530	R154	3001063300000	33Ω
531	R155	3001063300000	33Ω
532	R156	3001063300000	33Ω
533	R157	3001063300000	33Ω
534	R158	3001063300000	33Ω
535	R159	3001063300000	33Ω
536	R160	3001063300000	33Ω
537	R161	3001063300000	33Ω
538	R162	3001063300000	33Ω
539	R163	3001063300000	33Ω
540	R165	3001063300000	33Ω
541	R166	3001063300000	33Ω
542	R168	3001063300000	33Ω
543	R169	3001063300000	33Ω

No.	Ref. No.	Part No.	Description
544	R170	3001063300000	33Ω
545	R171	3001063300000	33Ω
546	R172	3001063300000	33Ω
547	R174	3001063300000	33Ω
548	R175	3001063300000	33Ω
549	R176	3001063300000	33Ω
550	R179	3001063300000	33Ω
551	R180	3001063300000	33Ω
552	R181	3001063300000	33Ω
553	R182	3001063300000	33Ω
554	R184	3001063300000	33Ω
555	R185	3001063300000	33Ω
556	R187	3001063300000	33Ω
557	R190	3001063300000	33Ω
558	R202	3001063300000	33Ω
559	R203	3001063300000	33Ω
560	R204	3001063300000	33Ω
561	R205	3001063300000	33Ω
562	R206	3001063300000	33Ω
563	R207	3001063300000	33Ω
564	R208	3001063300000	33Ω
565	R209	3001063300000	33Ω
566	R210	3001063300000	33Ω
567	R211	3001063300000	33Ω
568	R220	3001063300000	33Ω
569	R227	3001063300000	33Ω
570	R230	3001063300000	33Ω
571	R231	3001063300000	33Ω
572	R232	3001063300000	33Ω
573	R233	3001063300000	33Ω
574	R234	3001063300000	33Ω
575	R235	3001063300000	33Ω
576	R236	3001063300000	33Ω
577	R237	3001063300000	33Ω
578	R244	3001063300000	33Ω
579	R253	3001063300000	33Ω
580	R254	3001063300000	33Ω
581	R264	3001063300000	33Ω
582	R271	3001063300000	33Ω
583	R272	3001063300000	33Ω
584	R274	3001063300000	33Ω
585	R275	3001063300000	33Ω

No.	Ref. No.	Part No.	Description
586	R276	3001063300000	33Ω
587	R277	3001063300000	33Ω
588	R278	3001063300000	33Ω
589	R279	3001063300000	33Ω
590	R291	3001063300000	33Ω
591	R293	3001063300000	33Ω
592	R294	3001063300000	33Ω
593	R295	3001063300000	33Ω
594	R296	3001063300000	33Ω
595	R297	3001063300000	33Ω
596	R298	3001063300000	33Ω
597	R299	3001063300000	33Ω
598	R300	3001063300000	33Ω
599	R301	3001063300000	33Ω
600	R3030	3001063300000	33Ω
601	R3039	3001063300000	33Ω
602	R304	3001063300000	33Ω
603	R3040	3001063300000	33Ω
604	R3041	3001063300000	33Ω
605	R3042	3001063300000	33Ω
606	R3043	3001063300000	33Ω
607	R3044	3001063300000	33Ω
608	R323	3001063300000	33Ω
609	R324	3001063300000	33Ω
610	R339	3001063300000	33Ω
611	R340	3001063300000	33Ω
612	R341	3001063300000	33Ω
613	R343	3001063300000	33Ω
614	R344	3001063300000	33Ω
615	R345	3001063300000	33Ω
616	R346	3001063300000	33Ω
617	R347	3001063300000	33Ω
618	R348	3001063300000	33Ω
619	R349	3001063300000	33Ω
620	R354	3001063300000	33Ω
621	R355	3001063300000	33Ω
622	R356	3001063300000	33Ω
623	R361	3001063300000	33Ω
624	R362	3001063300000	33Ω
625	R363	3001063300000	33Ω
626	R364	3001063300000	33Ω
627	R365	3001063300000	33Ω

No.	Ref. No.	Part No.	Description
628	R366	3001063300000	33Ω
629	R367	3001063300000	33Ω
630	R368	3001063300000	33Ω
631	R371	3001063300000	33Ω
632	R372	3001063300000	33Ω
633	R386	3001063300000	33Ω
634	R387	3001063300000	33Ω
635	R390	3001063300000	33Ω
636	R391	3001063300000	33Ω
637	R397	3001063300000	33Ω
638	R401	3001063300000	33Ω
639	R487	3001063300000	33Ω
640	R489	3001063300000	33Ω
641	R490	3001063300000	33Ω
642	R492	3001063300000	33Ω
643	R507	3001063300000	33Ω
644	R508	3001063300000	33Ω
645	R509	3001063300000	33Ω
646	R510	3001063300000	33Ω
647	R511	3001063300000	33Ω
648	R551	3001063300000	33Ω
649	R552	3001063300000	33Ω
650	R553	3001063300000	33Ω
651	R554	3001063300000	33Ω
652	R555	3001063300000	33Ω
653	R556	3001063300000	33Ω
654	R557	3001063300000	33Ω
655	R558	3001063300000	33Ω
656	R606	3001063300000	33Ω
657	R607	3001063300000	33Ω
658	R608	3001063300000	33Ω
659	R609	3001063300000	33Ω
660	R611	3001063300000	33Ω
661	R612	3001063300000	33Ω
662	R613	3001063300000	33Ω
663	R614	3001063300000	33Ω
664	R615	3001063300000	33Ω
665	R616	3001063300000	33Ω
666	R627	3001063300000	33Ω
667	R634	3001063300000	33Ω
668	R635	3001063300000	33Ω
669	R656	3001063300000	33Ω

No.	Ref. No.	Part No.	Description
670	R660	3001063300000	33Ω
671	R733	3001063300000	33Ω
672	R735	3001063300000	33Ω
673	R736	3001063300000	33Ω
674	R739	3001063300000	33Ω
675	R740	3001063300000	33Ω
676	R741	3001063300000	33Ω
677	R742	3001063300000	33Ω
678	R743	3001063300000	33Ω
679	R744	3001063300000	33Ω
680	R745	3001063300000	33Ω
681	R746	3001063300000	33Ω
682	R747	3001063300000	33Ω
683	R748	3001063300000	33Ω
684	R749	3001063300000	33Ω
685	R750	3001063300000	33Ω
686	R751	3001063300000	33Ω
687	R754	3001063300000	33Ω
688	R956	3001063300000	33Ω
689	R164	3001060000000	0Ω
690	R183	3001060000000	0Ω
691	R196	3001060000000	0Ω
692	R198	3001060000000	0Ω
693	R201	3001060000000	0Ω
694	R212	3001060000000	0Ω
695	R214	3001060000000	0Ω
696	R215	3001060000000	0Ω
697	R243	3001060000000	0Ω
698	R245	3001060000000	0Ω
699	R246	3001060000000	0Ω
700	R247	3001060000000	0Ω
701	R249	3001060000000	0Ω
702	R250	3001060000000	0Ω
703	R258	3001060000000	0Ω
704	R259	3001060000000	0Ω
705	R286	3001060000000	0Ω
706	R287	3001060000000	0Ω
707	R289	3001060000000	0Ω
708	R292	3001060000000	0Ω
709	R3002	3001060000000	0Ω
710	R3003	3001060000000	0Ω
711	R3009	3001060000000	0Ω

No.	Ref. No.	Part No.	Description
712	R3011	3001060000000	0Ω
713	R3012	3001060000000	0Ω
714	R3017	3001060000000	0Ω
715	R3019	3001060000000	0Ω
716	R302	3001060000000	0Ω
717	R3021	3001060000000	0Ω
718	R3022	3001060000000	0Ω
719	R3023	3001060000000	0Ω
720	R3026	3001060000000	0Ω
721	R3034	3001060000000	0Ω
722	R3052	3001060000000	0Ω
723	R3054	3001060000000	0Ω
724	R3057	3001060000000	0Ω
725	R3059	3001060000000	0Ω
726	R3060	3001060000000	0Ω
727	R3061	3001060000000	0Ω
728	R310	3001060000000	0Ω
729	R313	3001060000000	0Ω
730	R314	3001060000000	0Ω
731	R325	3001060000000	0Ω
732	R327	3001060000000	0Ω
733	R328	3001060000000	0Ω
734	R329	3001060000000	0Ω
735	R330	3001060000000	0Ω
736	R332	3001060000000	0Ω
737	R334	3001060000000	0Ω
738	R335	3001060000000	0Ω
739	R336	3001060000000	0Ω
740	R342	3001060000000	0Ω
741	R350	3001060000000	0Ω
742	R351	3001060000000	0Ω
743	R352	3001060000000	0Ω
744	R357	3001060000000	0Ω
745	R358	3001060000000	0Ω
746	R384	3001060000000	0Ω
747	R385	3001060000000	0Ω
748	R389	3001060000000	0Ω
749	R395	3001060000000	0Ω
750	R396	3001060000000	0Ω
751	R398	3001060000000	0Ω
752	R399	3001060000000	0Ω
753	R400	3001060000000	0Ω

No.	Ref. No.	Part No.	Description
754	R408	3001060000000	0Ω
755	R416	3001060000000	0Ω
756	R423	3001060000000	0Ω
757	R426	3001060000000	0Ω
758	R428	3001060000000	0Ω
759	R430	3001060000000	0Ω
760	R439	3001060000000	0Ω
761	R440	3001060000000	0Ω
762	R444	3001060000000	0Ω
763	R447	3001060000000	0Ω
764	R449	3001060000000	0Ω
765	R484	3001060000000	0Ω
766	R491	3001060000000	0Ω
767	R501	3001060000000	0Ω
768	R516	3001060000000	0Ω
769	R519	3001060000000	0Ω
770	R520	3001060000000	0Ω
771	R523	3001060000000	0Ω
772	R524	3001060000000	0Ω
773	R525	3001060000000	0Ω
774	R532	3001060000000	0Ω
775	R534	3001060000000	0Ω
776	R566	3001060000000	0Ω
777	R572	3001060000000	0Ω
778	R579	3001060000000	0Ω
779	R580	3001060000000	0Ω
780	R592	3001060000000	0Ω
781	R602	3001060000000	0Ω
782	R603	3001060000000	0Ω
783	R604	3001060000000	0Ω
784	R610	3001060000000	0Ω
785	R618	3001060000000	0Ω
786	R619	3001060000000	0Ω
787	R623	3001060000000	0Ω
788	R636	3001060000000	0Ω
789	R638	3001060000000	0Ω
790	R647	3001060000000	0Ω
791	R648	3001060000000	0Ω
792	R651	3001060000000	0Ω
793	R652	3001060000000	0Ω
794	R653	3001060000000	0Ω
795	R675	3001060000000	0Ω

No.	Ref. No.	Part No.	Description
796	R677	3001060000000	0Ω
797	R737	3001060000000	0Ω
798	R738	3001060000000	0Ω
799	R756	3001060000000	0Ω
800	R814	3001060000000	0Ω
801	R823	3001060000000	0Ω
802	R833	3001060000000	0Ω
803	R848	3001060000000	0Ω
804	R904	3001060000000	0Ω
805	R905	3001060000000	0Ω
806	R907	3001060000000	0Ω
807	R910	3001060000000	0Ω
808	R913	3001060000000	0Ω
809	R914	3001060000000	0Ω
810	R916	3001060000000	0Ω
811	R917	3001060000000	0Ω
812	R918	3001060000000	0Ω
813	R919	3001060000000	0Ω
814	R920	3001060000000	0Ω
815	R925	3001060000000	0Ω
816	R926	3001060000000	0Ω
817	R927	3001060000000	0Ω
818	R928	3001060000000	0Ω
819	R929	3001060000000	0Ω
820	R931	3001060000000	0Ω
821	R932	3001060000000	0Ω
822	R933	3001060000000	0Ω
823	R934	3001060000000	0Ω
824	R936	3001060000000	0Ω
825	R937	3001060000000	0Ω
826	R938	3001060000000	0Ω
827	R940	3001060000000	0Ω
828	R941	3001060000000	0Ω
829	R942	3001060000000	0Ω
830	R943	3001060000000	0Ω
831	R946	3001060000000	0Ω
832	R947	3001060000000	0Ω
833	R948	3001060000000	0Ω
834	R958	3001060000000	0Ω
835	R959	3001060000000	0Ω
836	R960	3001060000000	0Ω
837	R961	3001060000000	0Ω

No.	Ref. No.	Part No.	Description
838	R186	3001061000000	10Ω
839	R189	3001061000000	10Ω
840	R224	3001061000000	10Ω
841	R226	3001061000000	10Ω
842	R268	3001061000000	10Ω
843	R269	3001061000000	10Ω
844	R3036	3001061000000	10Ω
845	R3038	3001061000000	10Ω
846	R319	3001061000000	10Ω
847	R320	3001061000000	10Ω
848	R815	3001061000000	10Ω
849	R177	3001061030010	10KΩ
850	R216	3001061030010	10KΩ
851	R217	3001061030010	10KΩ
852	R218	3001061030010	10KΩ
853	R219	3001061030010	10KΩ
854	R223	3001061030010	10KΩ
855	R228	3001061030010	10KΩ
856	R229	3001061030010	10KΩ
857	R260	3001061030010	10KΩ
858	R261	3001061030010	10KΩ
859	R262	3001061030010	10KΩ
860	R263	3001061030010	10KΩ
861	R267	3001061030010	10KΩ
862	R270	3001061030010	10KΩ
863	R273	3001061030010	10KΩ
864	R3001	3001061030010	10KΩ
865	R3005	3001061030010	10KΩ
866	R3010	3001061030010	10KΩ
867	R3013	3001061030010	10KΩ
868	R3014	3001061030010	10KΩ
869	R3020	3001061030010	10KΩ
870	R3029	3001061030010	10KΩ
871	R3035	3001061030010	10KΩ
872	R3037	3001061030010	10KΩ
873	R315	3001061030010	10KΩ
874	R316	3001061030010	10KΩ
875	R317	3001061030010	10KΩ
876	R318	3001061030010	10KΩ
877	R322	3001061030010	10KΩ
878	R337	3001061030010	10KΩ
879	R338	3001061030010	10KΩ

No.	Ref. No.	Part No.	Description
880	R373	3001061030010	10KΩ
881	R379	3001061030010	10KΩ
882	R380	3001061030010	10KΩ
883	R381	3001061030010	10KΩ
884	R382	3001061030010	10KΩ
885	R383	3001061030010	10KΩ
886	R388	3001061030010	10KΩ
887	R392	3001061030010	10KΩ
888	R393	3001061030010	10KΩ
889	R394	3001061030010	10KΩ
890	R402	3001061030010	10KΩ
891	R403	3001061030010	10KΩ
892	R404	3001061030010	10KΩ
893	R409	3001061030010	10KΩ
894	R410	3001061030010	10KΩ
895	R413	3001061030010	10KΩ
896	R429	3001061030010	10KΩ
897	R437	3001061030010	10KΩ
898	R438	3001061030010	10KΩ
899	R441	3001061030010	10KΩ
900	R442	3001061030010	10KΩ
901	R445	3001061030010	10KΩ
902	R448	3001061030010	10KΩ
903	R453	3001061030010	10KΩ
904	R454	3001061030010	10KΩ
905	R481	3001061030010	10KΩ
906	R482	3001061030010	10KΩ
907	R483	3001061030010	10KΩ
908	R485	3001061030010	10KΩ
909	R486	3001061030010	10KΩ
910	R488	3001061030010	10KΩ
911	R514	3001061030010	10KΩ
912	R515	3001061030010	10KΩ
913	R522	3001061030010	10KΩ
914	R533	3001061030010	10KΩ
915	R539	3001061030010	10KΩ
916	R540	3001061030010	10KΩ
917	R543	3001061030010	10KΩ
918	R567	3001061030010	10KΩ
919	R571	3001061030010	10KΩ
920	R583	3001061030010	10KΩ
921	R632	3001061030010	10KΩ

No.	Ref. No.	Part No.	Description
922	R633	3001061030010	10KΩ
923	R702	3001061030010	10KΩ
924	R703	3001061030010	10KΩ
925	R704	3001061030010	10KΩ
926	R705	3001061030010	10KΩ
927	R706	3001061030010	10KΩ
928	R708	3001061030010	10KΩ
929	R709	3001061030010	10KΩ
930	R710	3001061030010	10KΩ
931	R711	3001061030010	10KΩ
932	R712	3001061030010	10KΩ
933	R713	3001061030010	10KΩ
934	R714	3001061030010	10KΩ
935	R715	3001061030010	10KΩ
936	R716	3001061030010	10KΩ
937	R718	3001061030010	10KΩ
938	R719	3001061030010	10KΩ
939	R720	3001061030010	10KΩ
940	R721	3001061030010	10KΩ
941	R722	3001061030010	10KΩ
942	R723	3001061030010	10KΩ
943	R724	3001061030010	10KΩ
944	R725	3001061030010	10KΩ
945	R730	3001061030010	10KΩ
946	R731	3001061030010	10KΩ
947	R732	3001061030010	10KΩ
948	R752	3001061030010	10KΩ
949	R845	3001061030010	10KΩ
950	R951	3001061030010	10KΩ
951	R952	3001061030010	10KΩ
952	R957	3001061030010	10KΩ
953	R3008	3001061030000	10KΩ
954	R3018	3001061030000	10KΩ
955	R3046	3001061030000	10KΩ
956	R238	3001061040010	100K
957	R239	3001061040010	100K
958	R240	3001061040010	100K
959	R280	3001061040010	100K
960	R281	3001061040010	100K
961	R282	3001061040010	100K
962	R3006	3001061040010	100K
963	R3007	3001061040010	100K

No.	Ref. No.	Part No.	Description
964	R3015	3001061040010	100K
965	R517	3001061040010	100K
966	R518	3001061040010	100K
967	R526	3001061040010	100K
968	R535	3001061040010	100K
969	R568	3001061040010	100K
970	R573	3001061040010	100K
971	R594	3001061040010	100K
972	R801	3001061040010	100K
973	R808	3001061040010	100K
974	R817	3001061040010	100K
975	R818	3001061040010	100K
976	R820	3001061040010	100K
977	R840	3001061040010	100K
978	R842	3001061040010	100K
979	R844	3001061040010	100K
980	R846	3001061040010	100K
981	R549	3001062730010	27KΩ
982	R303	3001061520000	1.5K
983	R321	3001061520000	1.5K
984	R628	3001061520000	1.5K
985	R3032	3001066830000	68KΩ
986	R803	3001066830020	68KΩ
987	R804	3001066830020	68KΩ
988	R505	3001064730000	47KΩ
989	R506	3001064730000	47KΩ
990	R537	3001064730000	47KΩ
991	R544	3001064730000	47KΩ
992	R562	3001064730000	47KΩ
993	R569	3001064730000	47KΩ
994	R574	3001064730000	47KΩ
995	R629	3001064730000	47KΩ
996	R819	3001064730000	47KΩ
997	R832	3001064730000	47KΩ
998	R849	3001064730000	47KΩ
999	R530	3001063930010	39KΩ
1000	R3031	3001063330000	33KΩ
1001	R789	3001063330000	33KΩ
1002	R791	3001063330000	33KΩ
1003	R793	3001063330000	33KΩ
1004	R795	3001063330000	33KΩ
1005	R546	3001063030020	30KΩ

No.	Ref. No.	Part No.	Description
1006	R547	3001063030020	30KΩ
1007	R548	3001063030020	30KΩ
1008	R564	3001063030020	30KΩ
1009	R570	3001063030020	30KΩ
1010	R542	3001061540000	150K
1011	R550	3001061530010	15KΩ
1012	R559	3001061530010	15KΩ
1013	R560	3001064710000	470Ω
1014	R790	3001064710000	470Ω
1015	R792	3001064710000	470Ω
1016	R794	3001064710000	470Ω
1017	R796	3001064710000	470Ω
1018	R624	3001070000000	0Ω
1019	R504	3001062220000	2.2KΩ
1020	R3051	3001064740000	470KΩ
1021	R816	3001064740000	470KΩ
1022	R829	3099064321010	4.32KΩ
1023	R831	3099066810000	681Ω
1024	R841	3001061240000	120KΩ
1025	R843	3001062040030	200KΩ
1026	R924	3001071000000	10Ω
1027	R930	3001067500090	75Ω
1028	R935	3001067500090	75Ω
1029	R3016	3001061140000	110KΩ
1030	R3024	3001068230000	82KΩ
1031	R3027	3001068230000	82KΩ
1032	R950	3001061050010	1MΩ
1033	L101	3221506601000	Ferrite bead
1034	L303	3221506601000	Ferrite bead
1035	L305	3221506601000	Ferrite bead
1036	L306	3221506601000	Ferrite bead
1037	L148	3221506181000	Ferrite bead
1038	L149	3221506181000	Ferrite bead
1039	L501	3221506181000	Ferrite bead
1040	L507	3221506181000	Ferrite bead
1041	L801	3221506181000	Ferrite bead
1042	L809	3221506181000	Ferrite bead
1043	L819	3221506181000	Ferrite bead
1044	L820	3221506181000	Ferrite bead
1045	L822	3221506181000	Ferrite bead
1046	L823	3221506181000	Ferrite bead
1047	L825	3221506181000	Ferrite bead

No.	Ref. No.	Part No.	Description
1048	L502	3221513600000	Ferrite bead
1049	L503	3221513600000	Ferrite bead
1050	L615	3221513600000	Ferrite bead
1051	L802	3221513600000	Ferrite bead
1052	L807	3221513600000	Ferrite bead
1053	L814	3221513600000	Ferrite bead
1054	L815	3221513600000	Ferrite bead
1055	L816	3221513600000	Ferrite bead
1056	L901	3221513600000	Ferrite bead
1057	L902	3221513600000	Ferrite bead
1058	L903	3221513600000	Ferrite bead
1059	L904	3221513600000	Ferrite bead
1060	L905	3221513600000	Ferrite bead
1061	L504	3221506601070	Ferrite bead
1062	L505	3221506601070	Ferrite bead
1063	L506	3221506300000	Ferrite bead
1064	L508	3221506300000	Ferrite bead
1065	L602	3221506300000	Ferrite bead
1066	L603	3221506300000	Ferrite bead
1067	L604	3221506300000	Ferrite bead
1068	L605	3221506300000	Ferrite bead
1069	L606	3221506300000	Ferrite bead
1070	L607	3221506300000	Ferrite bead
1071	L608	3221506300000	Ferrite bead
1072	L609	3221506300000	Ferrite bead
1073	L610	3221506300000	Ferrite bead
1074	L611	3221506300000	Ferrite bead
1075	L612	3221506300000	Ferrite bead
1076	L613	3221506300000	Ferrite bead
1077	L147	3210406471000	470nH
1078	L151	3210406471000	470nH
1079	L803	3217699153000	15UH
1080	L804	3217699153000	15UH
1081	L805	3241799103000	10uH
1082	L813	3241799103000	10uH
1083	L821	3211799622010	6.2uH
1084	L824	3217199223000	22uH
1085	L826	3217199223000	22uH
1086	Q702	3414999000000	Bias resistor transistor
1087	Q703	3414999000000	Bias resistor transistor
1088	Q704	3414999000000	Bias resistor transistor
1089	Q705	3414999000000	Bias resistor transistor

No.	Ref. No.	Part No.	Description
1090	Q706	3414999000000	Bias resistor transistor
1091	Q707	3414999000000	Bias resistor transistor
1092	Q708	3414999000000	Bias resistor transistor
1093	Q709	3414999000000	Bias resistor transistor
1094	Q710	3414999000000	Bias resistor transistor
1095	Q506	3403008000010	Bias resistor transistor
1096	Q603	3403008000010	Bias resistor transistor
1097	Q605	3403008000010	Bias resistor transistor
1098	Q601	3403002000000	PNP transistor
1099	Q802	3403002000010	PNP transistor
1100	Q803	3503020000030	N-MOSFET
1101	U102	3610010000010	MCU OMAP5912ZZG
1102	U202	3610010000010	MCU OMAP5912ZZG
1103	U105	3608012000000	Level converter IC
1104	U233	3612002000020	Memory
1105	U234	3612002000020	Memory
1106	U301	3606010000030	A/D converter IC
1107	U302	3605002057090	Operational amplifier
1108	U306	3605002057090	Operational amplifier
1109	U305	3605008005070	Operational amplifier
1110	U303	3606010000010	D/A converter IC
1111	U304	3606010000010	D/A converter IC
1112	U501	3613010000000	Audio decoder IC
1113	U502	3602023005740	Audio amplifier IC
1114	U503	3605010000020	Operational amplifier
1115	U504	3605010000020	Operational amplifier
1116	U702	3699053000000	SmartSwitch
1117	U801	3608010000080	Power management IC
1118	U802	3608010000080	Power management IC
1119	U803	3608010000020	Power management IC
1120	U806	3608006000000	Power management IC
1121	U807	3608015000060	Power management IC
1122	U821	3608026000000	Power management IC
1123	X102	3701327610060	Crystal
1124	X105	3701327610060	Crystal
1125	X302	3701019250040	Temperature compensated crystal oscillator
1126	D101	3307110100080	Light emitting diode
1127	D901	3307110100080	Light emitting diode
1128	D902	3307110100080	Light emitting diode
1129	D903	3307110100080	Light emitting diode
1130	D904	3307110100080	Light emitting diode
1131	D905	3307110100080	Light emitting diode

No.	Ref. No.	Part No.	Description
1132	D906	3307110100080	Light emitting diode
1133	D907	3307110100080	Light emitting diode
1134	D908	3307110100080	Light emitting diode
1135	D201	3307110200000	Light emitting diode
1136	D502	3302031100010	Zener diode
1137	D503	3302031100010	Zener diode
1138	D601	3303100500000	Switching diode
1139	D605	3303100500000	Switching diode
1140	D602	3399040600010	ESD protection diode
1141	D603	3399040600010	ESD protection diode
1142	D608	3399040600010	ESD protection diode
1143	D604	3699037000010	USB protection IC
1144	D708	3699037000010	USB protection IC
1145	D702	3310990000090	ESD protection diode
1146	D709	3310990000090	ESD protection diode
1147	D805	3310990000090	ESD protection diode
1148	D806	3310990000090	ESD protection diode
1149	D801	3301100300030	Rectifier diode
1150	D804	3301100300030	Rectifier diode
1151	D807	3311240100000	Schottky diode
1152	D808	3311240100000	Schottky diode
1153	D809	3302030500030	Zener diode
1154	F802	4001000000130	Resumable fuse
1155	F803	4002000000270	SMT fuse
1156	J604	5202005100000	Board-to-wire connector
1157	J605	5202005100000	Board-to-wire connector
1158	J602	5206040200010	FFC connector
1159	C804	3103994760180	Electrolytic capacitor
1160	C816	3103994760180	Electrolytic capacitor
1161	C859	3103994760180	Electrolytic capacitor
1162	C811	3103993370000	Electrolytic capacitor
1163			PCB
1164	R241	3001064720000	4.7KΩ
1165	R242	3001064720000	4.7KΩ
1166	R283	3001064720000	4.7KΩ
1167	R284	3001064720000	4.7KΩ
1168	R513	3001064720000	4.7KΩ
1169	R620	3001064720000	4.7KΩ
1170	R821	3001064720000	4.7KΩ
1171	R836	3001064720000	4.7KΩ
1172	D501	3310240000000	ESD protection diode
1173	D504	3310240000000	ESD protection diode

No.	Ref. No.	Part No.	Description
1174	D505	3310240000000	ESD protection diode
1175	D607	3310240000000	ESD protection diode
1176	D703	3310240000000	ESD protection diode
1177	D704	3310240000000	ESD protection diode
1178	D705	3310240000000	ESD protection diode
1179	D706	3310240000000	ESD protection diode
1180	D707	3310240000000	ESD protection diode
1181	D710	3310240000000	ESD protection diode
1182	D711	3310240200000	ESD protection diode
1183	D810	3310240200000	ESD protection diode
1184	D811	3310240200000	ESD protection diode
1185	D812	3310240200000	ESD protection diode
1186	Q501	3499000000150	Composite transistor
1187	Q502	3499000000150	Composite transistor
1188	Q503	3499000000150	Composite transistor
1189	Q504	3499000000150	Composite transistor
1190	Q505	3499000000150	Composite transistor
1191	Q507	3499000000150	Composite transistor
1192	Q508	3499000000150	Composite transistor
1193	R503	3001062740000	270KΩ
1194	R195	3001062230030	22KΩ
1195	R200	3001062230030	22KΩ
1196	R802	3001062230030	22KΩ
1197	R805	3001062230030	22KΩ
1198	R806	3001062230030	22KΩ
1199	R807	3001062230030	22KΩ
1200	U805	3609010000210	Reset IC
1201	R939	3099061242020	270KΩ
1202	R908	3099074999010	22KΩ
1203	R909	3099074999010	22KΩ
1204	R912	3099074999010	22KΩ
1205	R923	3099074999010	22KΩ
1206	T901	5406000000120	Transformer
1207	U901	3609999007670	Interface controller
1208	X901	3701002560000	crystal
1209	C865	3104206860020	68uF
1210	C869	3104206860020	68uF
1211	C871	3104206860020	68uF
1212	U232	3612044000010	Memory
1213	U235	3612044000010	Memory
1214	R810	3001063910000	390Ω
1215	U701	3607082000040	Logic IC

No.	Ref. No.	Part No.	Description
1216	R717	3001063920010	3.9KΩ
1217	R798	3001063920010	3.9KΩ
1218	U401	3607023000150	Logic IC
1219	R696	3001065610000	560Ω
1220	C382	3101063320000	3300PF

Front Panel

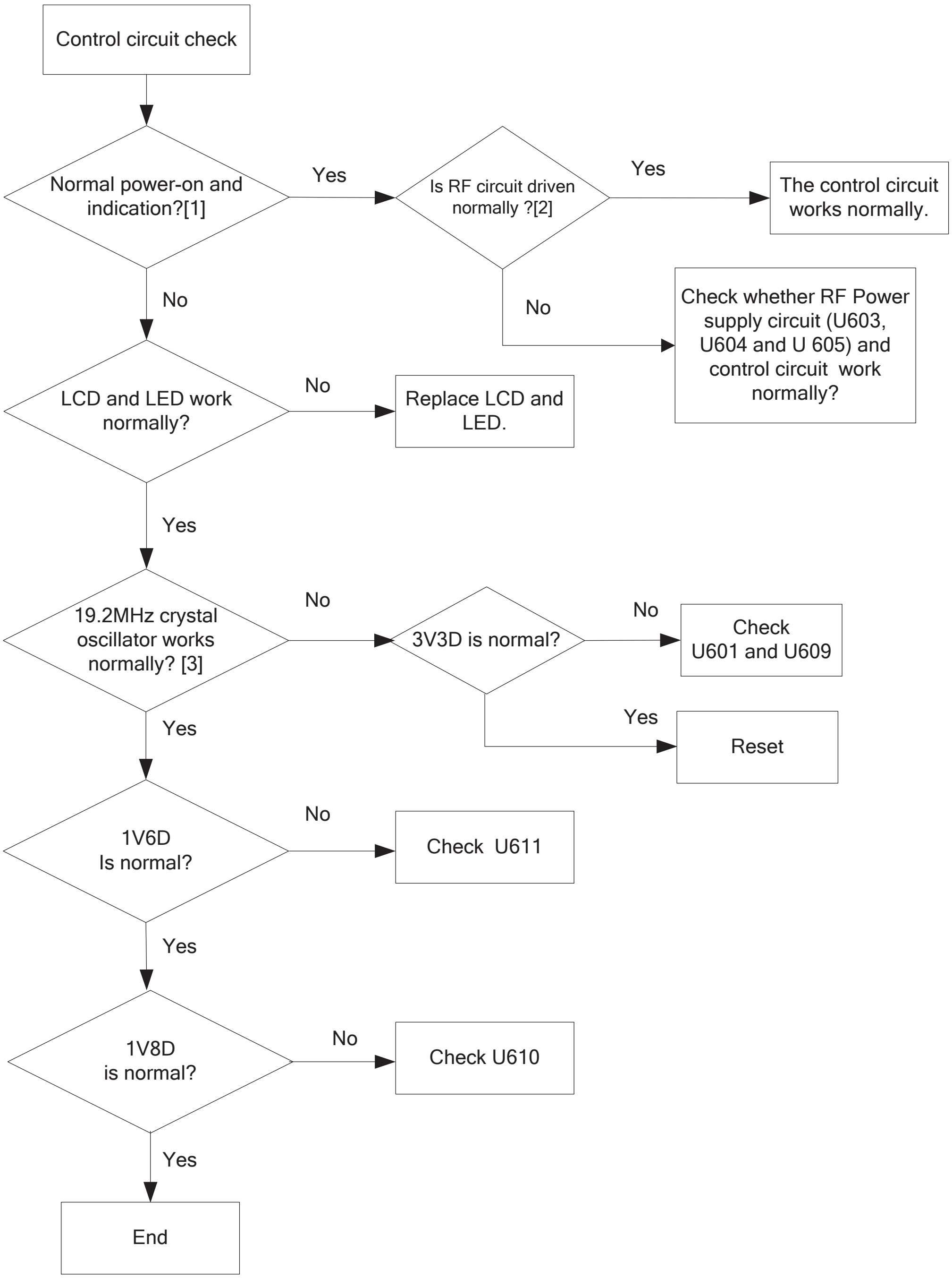
No.	Ref. No.	Part No.	Description
1	C16	3101061010010	100PF
2	C18	3101061010010	100PF
3	C19	3101061010010	100PF
4	C20	3101061010010	100PF
5	C21	3101061010010	100PF
6	C22	3101061010010	100PF
7	C23	3101061010010	100PF
8	C24	3101061010010	100PF
9	C28	3101061010010	100PF
10	C29	3101061010010	100PF
11	C30	3101061010010	100PF
12	C31	3101061010010	100PF
13	C32	3101061010010	100PF
14	C33	3101061010010	100PF
15	C35	3101061010010	100PF
16	C36	3101061010010	100PF
17	C37	3101061010010	100PF
18	C38	3101061010010	100PF
19	C39	3101061010010	100PF
20	C45	3101061010010	100PF
21	C46	3101061010010	100PF
22	C47	3101061010010	100PF
23	C48	3101061010010	100PF
24	C50	3101061010010	100PF
25	C52	3101061010010	100PF
26	C53	3101061010010	100PF
27	C1	3101064710000	470PF
28	C11	3101064710000	470PF
29	C12	3101064710000	470PF
30	C2	3101064710000	470PF
31	C6	3101064710000	470PF
32	C7	3101064710000	470PF
33	C8	3101064710000	470PF
34	C9	3101064710000	470PF
35	C15	3101061040010	0.1UF
36	C17	3101061040010	0.1UF
37	C42	3101061040010	0.1UF
38	C43	3101061040010	0.1UF
39	C44	3101061040010	0.1UF
40	C49	3101061040010	0.1UF
41	C51	3101061040010	0.1UF

No.	Ref. No.	Part No.	Description
42	C13	3101061050000	1UF
43	C14	3101061050000	1UF
44	C26	3101061050000	1UF
45	C27	3101061050000	1UF
46	C25	3104082260060	22UF
47	R22	3001060000000	0Ω
48	R29	3001060000000	0Ω
49	R30	3001060000000	0Ω
50	R39	3001063300000	33Ω
51	R25	3001065100030	51Ω
52	R27	3001065100030	51Ω
53	R28	3001065100030	51Ω
54	R2	3001065610000	560Ω
55	R15	3001061020010	1KΩ
56	R16	3001061020010	1KΩ
57	R46	3001061020010	1KΩ
58	R47	3001061020010	1KΩ
59	R48	3001061020010	1KΩ
60	R14	3001061030010	10KΩ
61	R32	3001061030010	10KΩ
62	R33	3001061030010	10KΩ
63	R34	3001061030010	10KΩ
64	R35	3001061030010	10KΩ
65	R36	3001061030010	10KΩ
66	R37	3001061030010	10KΩ
67	R40	3001061030010	10KΩ
68	R41	3001061030010	10KΩ
69	R42	3001061030010	10KΩ
70	R43	3001061030010	10KΩ
71	R44	3001061030010	10KΩ
72	R45	3001061030010	10KΩ
73	R49	3001061030010	10KΩ
74	R50	3001061030010	10KΩ
75	R51	3001061030010	10KΩ
76	R17	3001061040010	100KΩ
77	R23	3001065600000	56Ω
78	R24	3001065600000	56Ω
79	R26	3001065600000	56Ω
80	R1	3001063010010	300Ω
81	R10	3001063010010	300Ω
82	R11	3001063010010	300Ω
83	R13	3001063010010	300Ω

No.	Ref. No.	Part No.	Description
84	R3	3001063010010	300Ω
85	R4	3001063010010	300Ω
86	R5	3001063010010	300Ω
87	D10	3307110300000	Light emitting diode
88	D11	3307110300000	Light emitting diode
89	D12	3307110300000	Light emitting diode
90	D9	3307110300000	Light emitting diode
91	D13	3307110100080	Light emitting diode
92	D14	3307110100080	Light emitting diode
93	D15	3307110100080	Light emitting diode
94	D16	3307110100080	Light emitting diode
95	D17	3307110100080	Light emitting diode
96	D18	3307110100080	Light emitting diode
97	D21	3310240000000	ESD protection diode
98	D19	3310240200000	ESD protection diode
99	D20	3310240200000	ESD protection diode
100	D420	3310240200000	ESD protection diode
101	D421	3310240200000	ESD protection diode
102	D422	3310240200000	ESD protection diode
103	D423	3310240200000	ESD protection diode
104	D424	3310240200000	ESD protection diode
105	D425	3310240200000	ESD protection diode
106	D22	3310990000090	ESD protection diode
107	D24	3310990000090	ESD protection diode
108	Q12	3503020000030	N-MOSFET
109	Q13	3503020000030	N-MOSFET
110	Q1	3403008000010	Bias resistor transistor
111	Q10	3403008000010	Bias resistor transistor
112	Q11	3403008000010	Bias resistor transistor
113	Q2	3403008000010	Bias resistor transistor
114	Q3	3403008000010	Bias resistor transistor
115	Q4	3403008000010	Bias resistor transistor
116	Q5	3403008000010	Bias resistor transistor
117	Q6	3403008000010	Bias resistor transistor
118	Q7	3403008000010	Bias resistor transistor
119	Q8	3403008000010	Bias resistor transistor
120	Q9	3403008000010	Bias resistor transistor
121	L1	3221506300000	Ferrite bead
122	L2	3221506300000	Ferrite bead
123	L418	3221505121000	Ferrite bead
124	L417	3221505121000	Ferrite bead
125	L416	3240707181000	Common-mode coil

No.	Ref. No.	Part No.	Description
126	S1	4301050000000	Tact switch
127	S2	4301050000000	Tact switch
128	S3	4301050000000	Tact switch
129	S4	4301050000000	Tact switch
130	S5	4301050000000	Tact switch
131	S6	4301050000000	Tact switch
132	U1	3607010000400	Logic IC
133	U5	3805000000030	EMI filter
134	U6	3805000000030	EMI filter
135	U7	3805000000030	EMI filter
136	U4	3608015000210	Power management IC
137	U8	3699037000010	USB protection IC
138	J2	5206040200010	FFC connector
139	R6	3001061510000	150Ω
140	R9	3001061510000	150Ω
141	R7	3001062010000	200Ω
142	R8	3001062010000	200Ω
143	C40	3101064740000	0.47UF
144	C41	3101064740000	0.47UF
145	J1	5206034200010	FPC connector
146			PCB
147	C34	3101061010010	100PF

6.7 Troubleshooting Flow Chart



Description of Normal Situations:

[1] The repeater shows normal power-on screen, and the backlight is normal.

[2] The RF power supply outputs normally, and the RX channel is on.

[3] Vpp: 700mV~800mV, F: 19.2MHz.

7. Tuning Description

For details about tuning, please refer to the help file for appropriate tuner software supplied by us.

8. Interface Definition

PA-Baseband (J105)		
Pin No.	**Name**	**Description**
1	Pf_DET	Forward power detection, ADC input
2	Temp_Protect_Volt	Alarm voltage for temperature protection circuit
3	APC	Output power setting, DAC output
4	VSWR_Protect_Volt	Alarm voltage for the VSWR protection circuit
5	Final_Bias	Bias voltage of final-stage PA, DAC output
6	GND	For grounding
7	Pr_DET	Reverse power detection, ADC input
8	PA_Enable	PA enable, TTL level, GPIO
9	RT1	Temperature detection signal, output by the thermistor
10	RT2	Temperature detection signal, output by the thermistor

Table 8-1 Interface between Baseband and PA

Exciter-Baseband (J101)		
Pin No.	**Name**	**Description**
1	MOD_L	Modulation signal of reference crystal oscillator, AC analog signal, from DAC
2	GND	For grounding
3	TX_PLL_CLK	PLL data clock
4	GND	For grounding
5	GND	For grounding
6	TX_Control_FL	Fast lock control (1: On; 0: Off)
7	TX_PLL_CS	PLL data enable
8	TX_VCO_Watch	TX VCO watch, voltage sent back to MCU via ADC

9	TX_PLL_Data	PLL data pin
10	TX_Control_LP	PLL lock detection enable (0: On; 1: Off)
11	TX_PLL_LD	PLL lock detect (1: locked; 0: unlocked)
12	GPS_LP	Loop filter switch (1: On; 0: Off)
13	GND	For grounding
14	MOD_H	Modulation signal of VCO, AC analog signal, from DAC
15	TX_PLL_Power_EN	Power supply enable for PLL (1: On; 0: Off)
16	T1/T2_EN	VCO1/VCO2 enable (0: VCO1 on; 1: VCO2 on)
17	TX_Pre_Drive_EN	Power supply enable for pre-driver amplifier (1: On; 0: Off)
18	GND	For grounding
19	9V3A	TX power supply
20	GND	For grounding

Table 8-2 Interface between Baseband and Exciter Module

RX-Baseband (J104)		
Pin No.	**Name**	**Description**
1	RX_RF_CS	Frequency adjustment for reference crystal oscillator, DAC output
2	GND	For grounding
3	RX_PLL_CLK	PLL clock pin
4	GND	For grounding
5	RX_PLL_LD	PLL lock detect
6	RX_FL_Control	Fast lock control
7	RX_PLL_EN	PLL enable pin
8	RX_LP_Control	Lock control
9	RX_PLL_Data	PLL data pin
10	RX_R1/R2_En	RX VCO1/VCO2 switch

11	98_SYNCB	Reset SSI/10-bit counter
12	RX_CV	RX CV voltage detect
13	98_FS	AD9864 SSI
14	RX_PLL_Power_EN	Power supply (5V/3.3V) enable for PLL
15	98_DOUTA	AD9864 SSI
16	98_PE	AD9864 SPI enable
17	98_DOUTB	AD9864 SSI
18	GND	For grounding
19	98_CLKOUT	AD9864 SSI
20	GND	For grounding
21	GND	For grounding
22	98_PC	AD9864 SPI clock
23	RX_PWR_EN	RX power supply (9.1V/5V/3.3V) enable
24	98_PD	AD9864 SPI data
25	9V3A	RX 9.3V voltage
26	TV	Band-pass control voltage

Table 8-3 Interface between Baseband and RX Module

DB26 (J701) is used for further development. Its definition is described in the table below:

Pin No.	Name	Description
1	NC	
2	GND	
3	DB26_GPIO4	General I/O interface with function defined through the CPS
4	SWB+	
5	NC	
6	AGND	
7	Tx Audio	External MIC signal input, subject to CPS settings
8	RX Audio	RX filter/flat audio output; The audio output type is subject to CPS settings.
9	GND	
10	D+	When this pin is used for USB, USB of MMP10

		will be disabled
11	GND	
12	DB26_GPIO2	General I/O interface with function defined through the CPS
13	ACC_IO2	Accessory identification pin (not defined)
14	PROM IN	Not defined
15	ACC_IO3	Accessory identification pin (not defined)
16	DB26_PTT_IN	Programmable input pin (PTT by default) valid for low level; configurable via CPS
17	GND	
18	Pf_DET	Not defined
19	D-	When this pin is used for USB, USB of MMP10 will be disabled
20	DB26_GPIO3	General I/O interface with function defined through the CPS
21	GND	
22	DB26_GPIO5	General I/O interface with function defined through the CPS
23	DB26_GPIO6	General input interface with function defined through the CPS
24	SlotA_Audio	1. Audio output of RX slot A 2. Select digital mode via the CPS
25	SlotB_Audio	1. Audio output of RX slot B 2. Select digital mode via the CPS
26	RSSI	RSSI indication output (reserved)

Table 8-4 Expansion Interface (DB26)

DB9(J601) is used to realize functions such as Program, Diagnose and Monitor, and has UART and USB ports. Its definition is described below:

Pin No.	Name	Description
1	TX_PLL_CS2_DB9	SPI chip select, used to control PLL
2	TX_PLL_CLK_DB9	SPI clock, used to control PLL
3	TX/RX	RS232 signal (default: TX)
4	TX_PLL_Data_DB9	SPI data, used to control PLL
5	RX/TX	RS232 signal (default: RX)
6	V_BUS	USB power supply, USB port

7	USB0_D-	USB data cable-, USB port
8	USB0_D+	USB data cable+, USB port
9	GND	Ground

Table 8-5 Definition of DB9

RJ45 (J901) is a TCP/IP port. It can be used to realize many functions such as remote monitoring. Its definition is shown below:

Pin No.	Name	Description
1	TXP	Data TX +
2	TXN	Data TX -
3	RXP	Data RX+
4	NC	
5	NC	
6	RXN	Data RX-
7	NC	
8	NC	

Table 8-6 Ethernet Interface Definition

9.UHF1 (400-470MHz) Information

9.1 TX Circuit

The TX circuit consists of power amplifier (PA) circuit, power control circuit, diagnosis and detection circuit and protection circuit. It is to amplify the RF signal from exciter module to 50W, which then will be output via the antenna. The power control circuit is used for keeping the RF power of antenna at a fixed level. For the diagnosis and detection circuit, it detects the current TX power, antenna VSWR and transmitter temperature, and sends the detection result to the repeater's control unit for monitoring the transmitter status. The role of protection circuit is to protect the power amplifier from being damaged due to high temperature or VSWR.

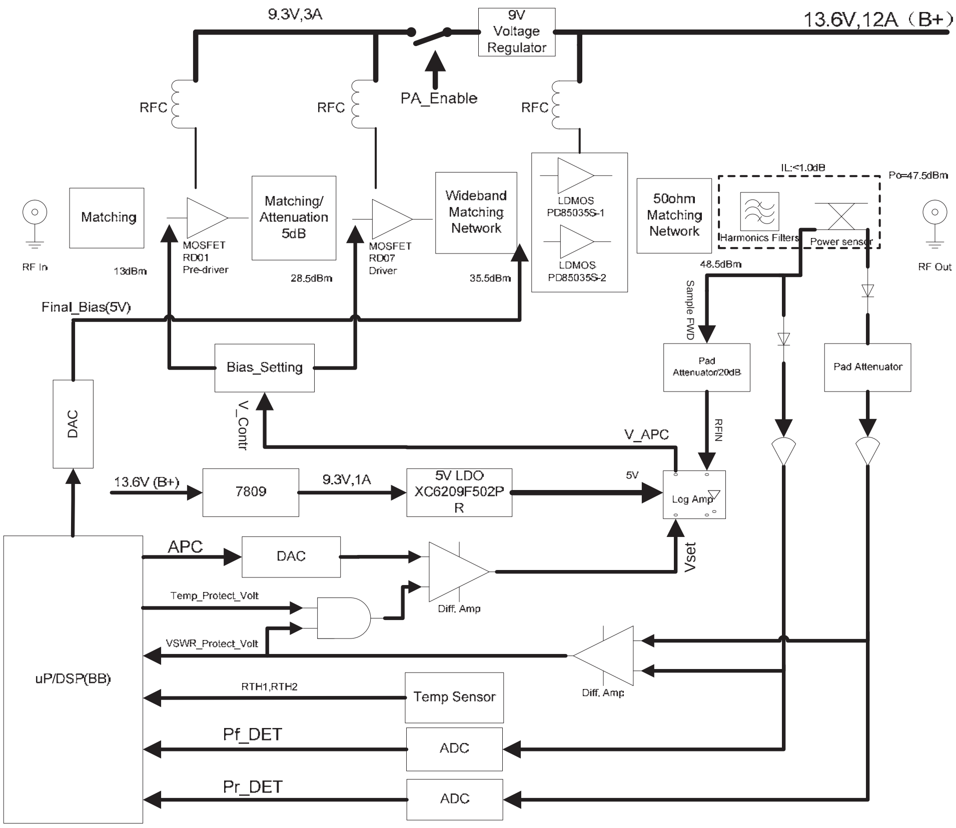


Figure 9-1 Block Diagram of PA Board

9.1.1 PA Module

The PA circuit of transmitter is composed of a 3-stage PA unit: pre-driver stage (Q401), driver stage (Q402) and final-stage (Q403 and Q404). Q401 and Q402 form the driver circuit, whose gain can be adjusted via the APC circuit, ensuring a constant RF power output of 50W.

9.1.2 Pre-driver Stage PA

This PA unit is a LDMOS power tube (Q401). It can amplify the 13dBm RF signals from exciter unit to

30dBm, which then will be sent to driver-stage PA via L-C network.

9.1.3 Driver Stage PA

This PA unit is a LDMOS power tube (Q402). It can further amplify the RF signals from Q401 to 38dBm, which is then sent to final-stage PA.

9.1.4 Final-stage PA

This PA unit consists of two LDMOS power tubes (Q403 and Q404). It can reduce the Q value of power input/output network and expand the bandwidth of PA circuit, ensuring PA circuit performance.

9.1.5 Harmonic Suppression filter

The harmonic filter of transmitter is a four-order LPF filter comprising C455, L410, C456, L412, C459, C460, L413, C461, C462, L414 and C465. It can decrease the harmonic component by increasing the out-of-band rejection capability.

9.1.6 Directional Coupler

The role of directional coupler is to detect forward and reverse power, so as to monitor and diagnose the operating status of transmitter. The forward power passes through a π-type attenuator, and then goes into the logarithmic amplifier, where it can automatically limit the output power of the transmitter to a relatively constant value (50W) according to the preset power level “Vset”. After going to the analog-to-digital converter (ADC) on the baseband board via the diode D402, the forward power is used to calculate the current TX power of the transmitter, which will be displayed in the diagnosis software in a real-time way. The directional coupler locates behind the LPF and is near the antenna output end. It is used to detect the reverse power. After going to the ADC on the baseboard via the diode D401, the reverse power is used to calculate the VSWR of antenna connector. An alarm will be generated when the VSWR is larger than the set threshold. Both forward and reverse detection voltages are calculated via a differential amplifier circuit (U407A). The output value is used to control the power level “Vset”. When the VSWR is too high, the TX power will be reduced to avoid damage to the PA.

9.1.7 Power Control

The transmitter power is controlled by power control circuit composed of logarithmic amplifier and directional coupler. After the transmitter power passes through the directional coupler, the detected RF signal goes to RF_IN of logarithmic amplifier via the Pi-type attenuator. Then the detected RF signal will adjust the output “Vapc” of logarithmic amplifier in a real time way based on the current power level “Vset”, so as to control the bias voltage at the gates of Q401 and Q402 and to ensure a constant output power.

9.1.8 Temperature Protection

The thermistor is close to the heat sink pad of the final-stage amplifier, and is used to detect the current temperature of the heat sink. When the temperature of heat sink rises to the default value, the fan will run; when the temperature drops to a certain level, the fan will stop running.

When the temperature is above ℃, the control unit will send an alarm signal. If the temperature rises continuously, the temperature protection circuit (U407B) will output a control voltage, to reduce the power level Vset, thus reducing the transmitter power and protecting the PA. When the temperature falls below 85℃, Vset and transmitter power will restore to their normal levels. Naturally, the alarm will dissolve.

9.1.9 Low-voltage and Over-voltage Protection

The control unit detects the voltage of system power supply in a real time way. When the voltage is below 12V, the control unit will reduce the TX power to 30W, ensuring no damage to the driver amplifier of transmitter. When the voltage is above 14.6V, it will reduce the power level to 40W, ensuring no damage to the final-stage amplifier of transmitter.

9.2 RX Circuit

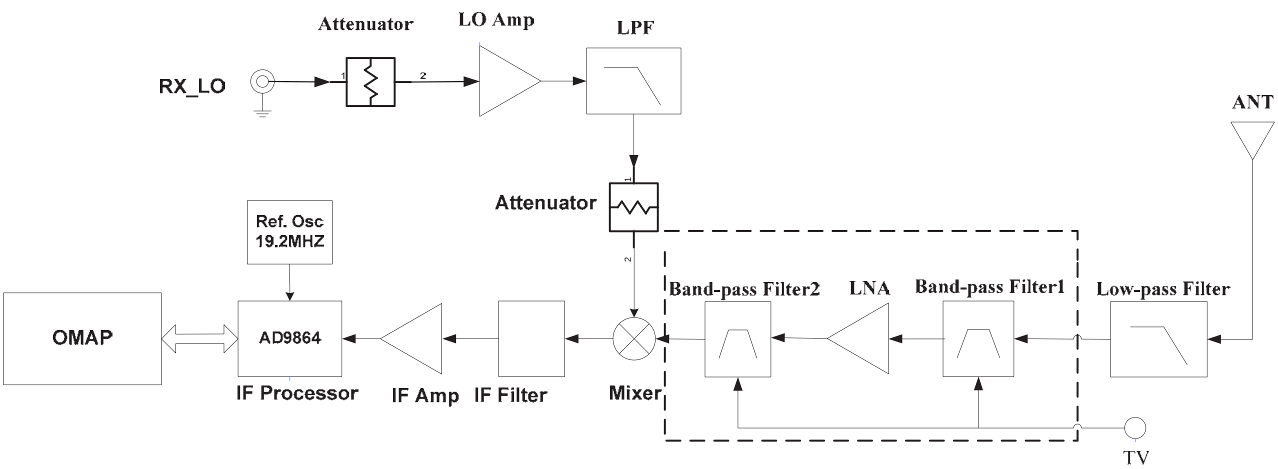


Figure 9-2 Block Diagram of Receiver Circuit

The receiver circuit mainly comprises the RF band-pass filter, low-noise amplifier, mixer, IF filter, IF amplifier and IF processor.

9.2.1 Front-end Circuit

The HF signal from the low-pass filter passes through the electrically tunable band-pass filter controlled via TV level, to remove out-of-band interference signal and to send wanted band-pass signal to the low-noise amplifier (U402). The amplified signal goes to a band-pass filter controlled via TV level, to remove out-of-band interference signal generated during amplification, and to send wanted HF signal to the mixer.

The wanted signal passes through the RF band-pass filter and low-noise amplifier and goes to the mixer (U403). Meanwhile, the first local oscillator (LO) signal generated by VCO passes through the low-pass filter and also goes to the mixer. In the mixer, the wanted signal and the first LO signal are mixed to generate the first IF signal (73.35MHz). Then the signal passes through the LC to suppress carrier other than the first IF signal, and to increase the isolation between the mixer and the IF filter. After that, the first IF signal goes to crystal filter (Z401) for filtering, and is sent to the two-stage IF amplifier circuit for amplification. Then the amplified signal goes to the IF processor U501 for further processing.

9.2.2 Rear-end Circuit

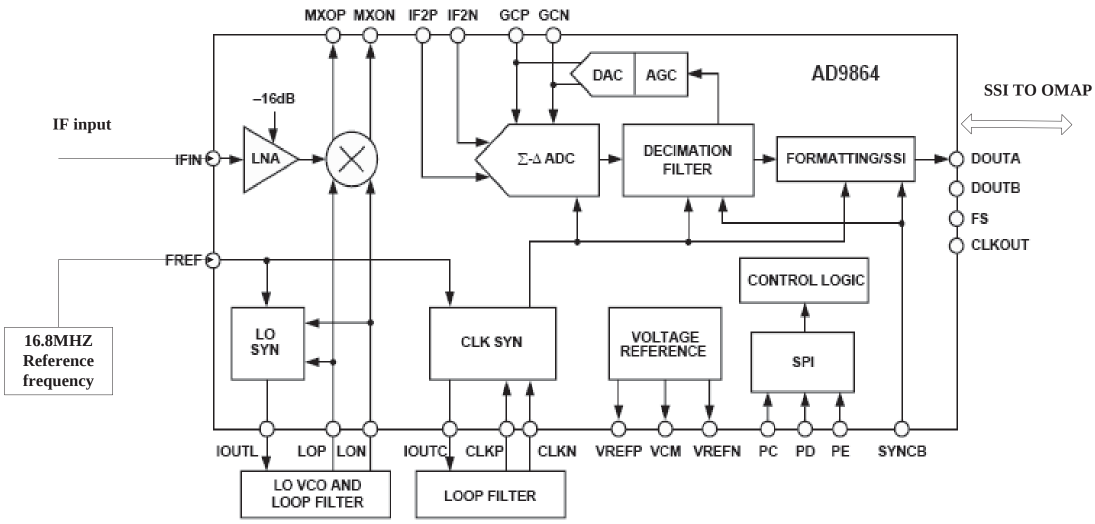


Figure 9-3 Diagram of IF Processor

The first IF signal (73.35MHz) output by the IF amplifier goes into U501 via Pin 47, where the signal is converted to the second IF signal (2.25MHz). Then the signal is converted to digital signal via ADC sampling, and output via the SSI interface. Finally, the digital signal is sent to DSP (OMAP5912) for demodulation.

U501 employs reference frequency of 19.2MHz and shares the crystal with OMAP. The second LO VCO comprises an oscillator, a varactor and some other components, to provide the 71.1/75.6MHz LO signal.

The 18MHz clock frequency is generated by the LC resonance loop.

9.3 Frequency Generation Unit (FGU)

The repeater has two FGUs. One is RX FGU providing the first LO frequency for the RX system; the other is TX FGU providing carrier and exciter signal for the TX system. They work simultaneously, but are locked at different frequencies.

Both RX FGU and TX FGU mainly consist of a reference crystal oscillator, a PLL, a VCO and a buffer amplifier. The PLL data is configured via OMAP. See the following figure:

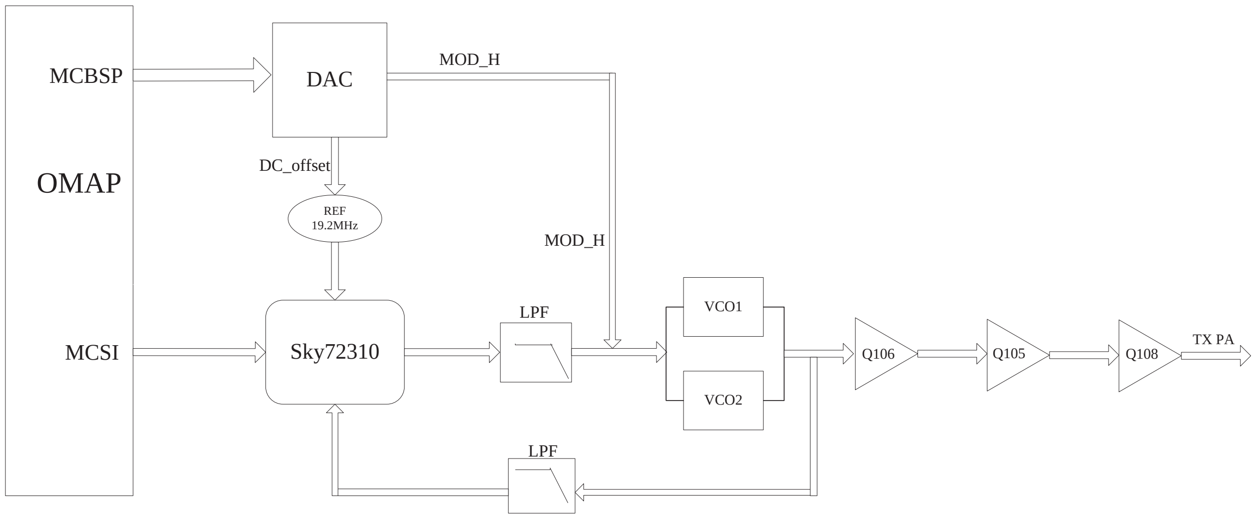


Figure 9-4 Block Diagram of Transmitter

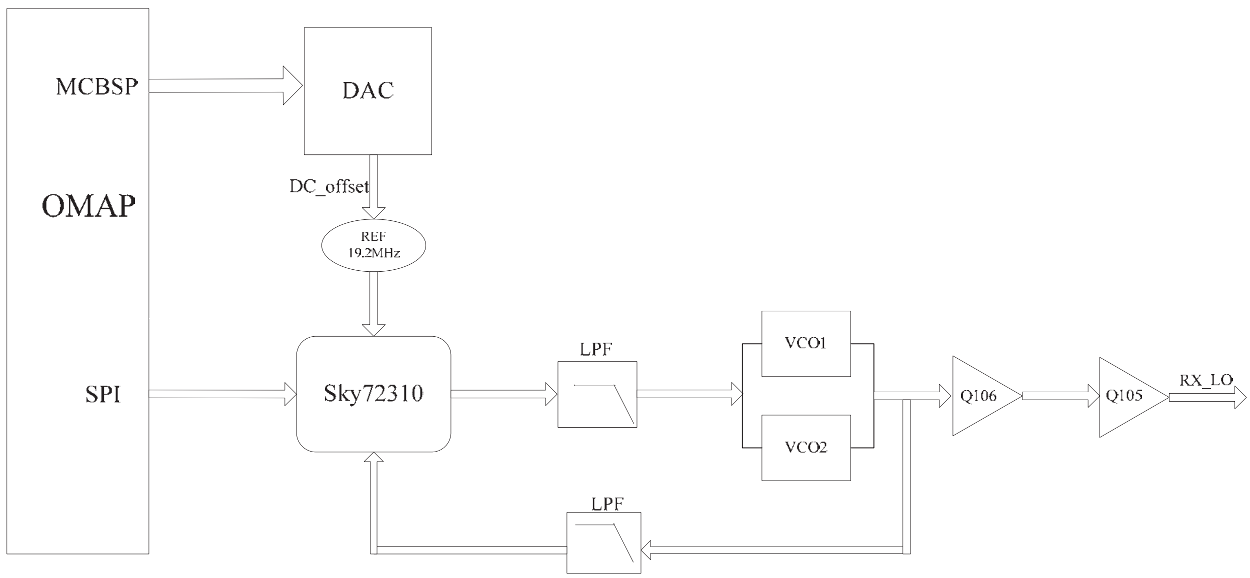


Figure 9-5 Block Diagram of Receiver

9.3.1 Reference Oscillator

The reference crystal oscillator is a temperature compensated crystal oscillator with a frequency of 19.2MHz. You can control the oscillator by adjusting the DC voltage output by the digital-to-analog

converter, so as to ensure frequency accuracy.

9.3.2 PLL IC

PLL IC consists of the pre-divider, programmable divider, phase detector, charge pump and etc. The voltage of analog circuit and digital circuit of PLL IC is 3.3V voltage, while the voltage of charge pump is 5V. See the following figure:

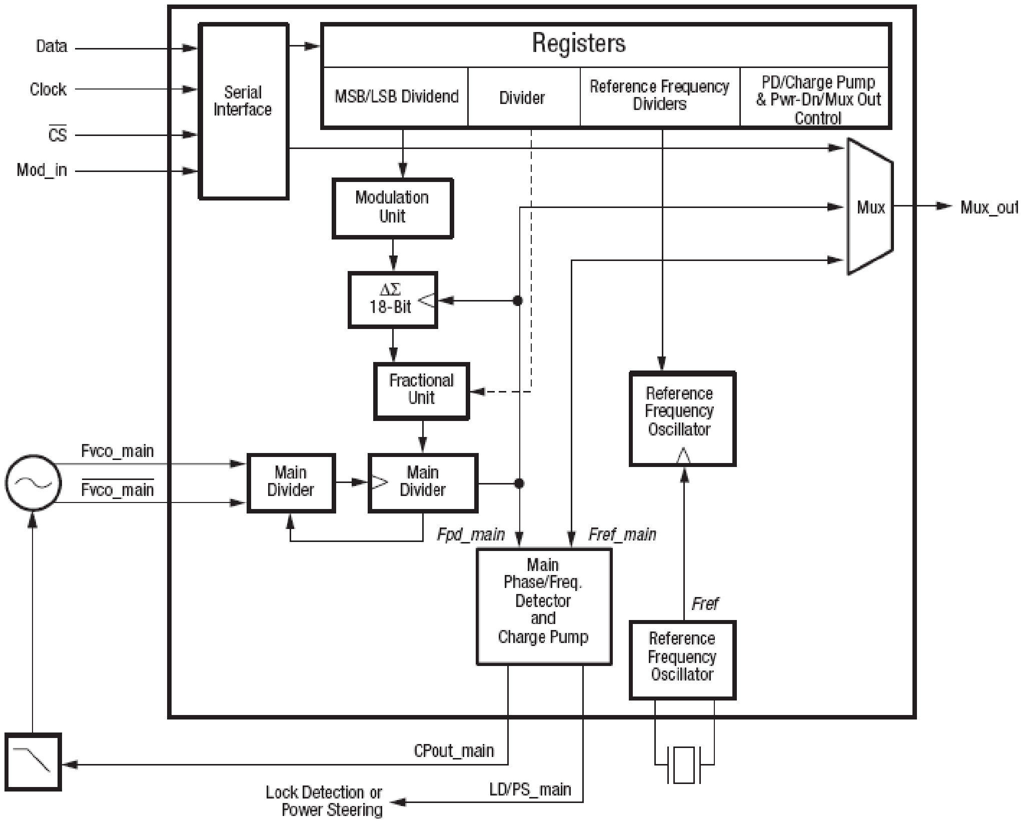


Figure 9-6 Block Diagram of PLL IC

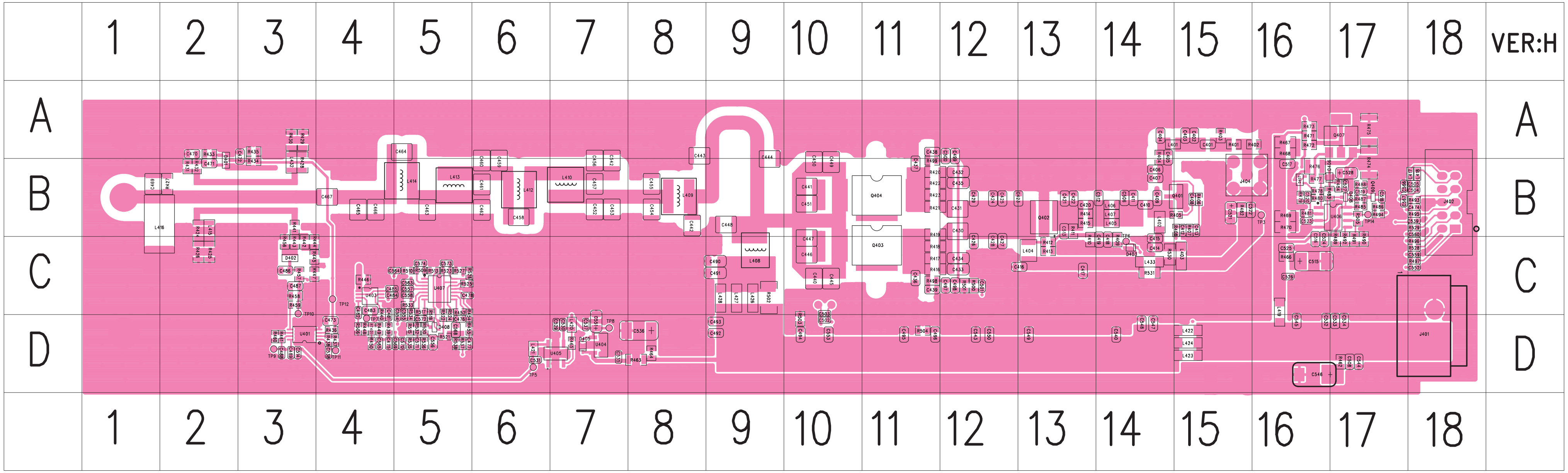
SKY72310's role is to generate appropriate frequency based on the data transmitted by OMAP of baseband board. The 19.2MHz frequency generated by the reference crystal oscillator goes into the PLL, to generate the reference frequency. Meanwhile, the frequency generated by VCO goes into PLL for frequency division. The resulting frequency will be compared with reference frequency in terms of phase difference in the phase detector. After comparison, the resulting frequency is converted to CV voltage via the loop filter, to control the output frequency of VCO. In addition, as a key component of the modulation circuit, PLL can directly obtain data from the MCSI port of OMAP for modulation.

9.3.3 VCO

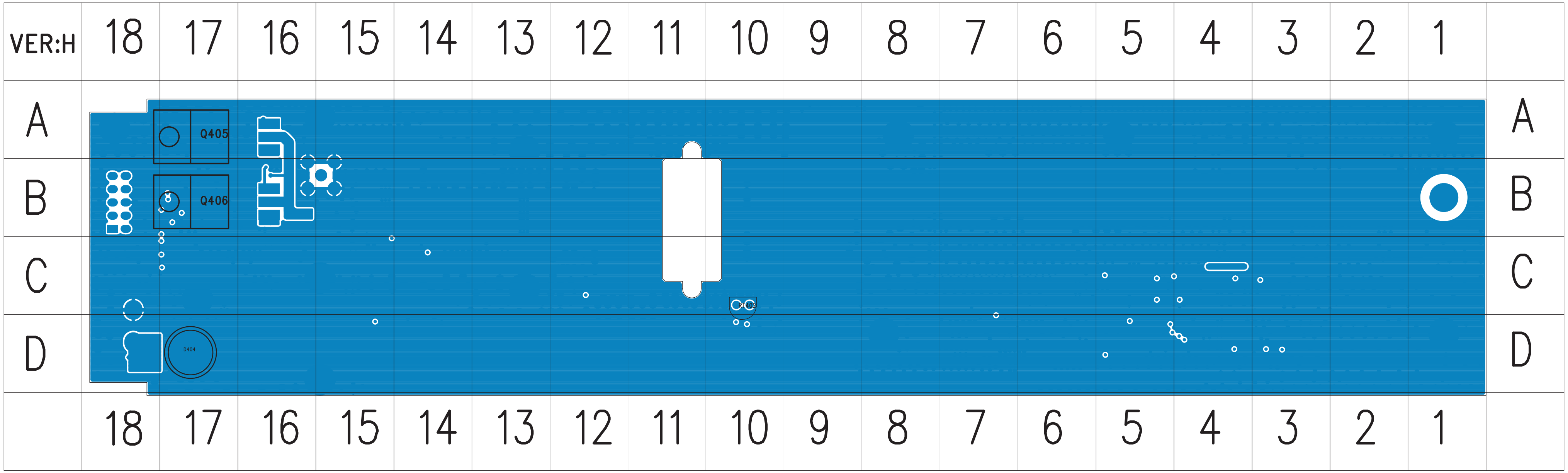
The VCO for RX unit comprises two transistors (Q101 and Q107), a varactor and four Colpitts oscillators. Q105 and Q106 are the buffer amplifiers for the RX unit. The components of VCO for TX unit are the same as those of RX unit. Q105 and Q106 are the buffer amplifiers for the TX unit.

9.4 PCB View

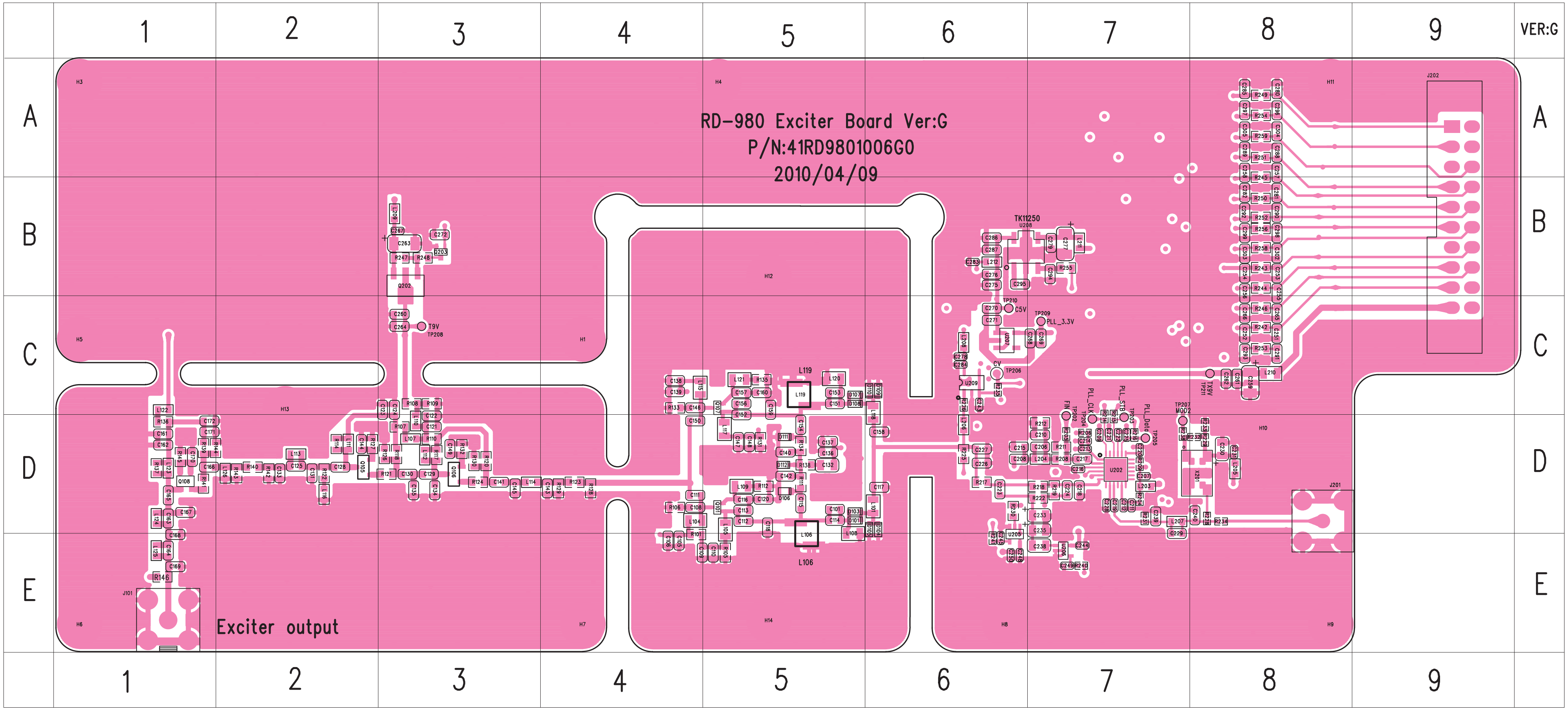
RD98X PCB View (PA Board)
Top Layer



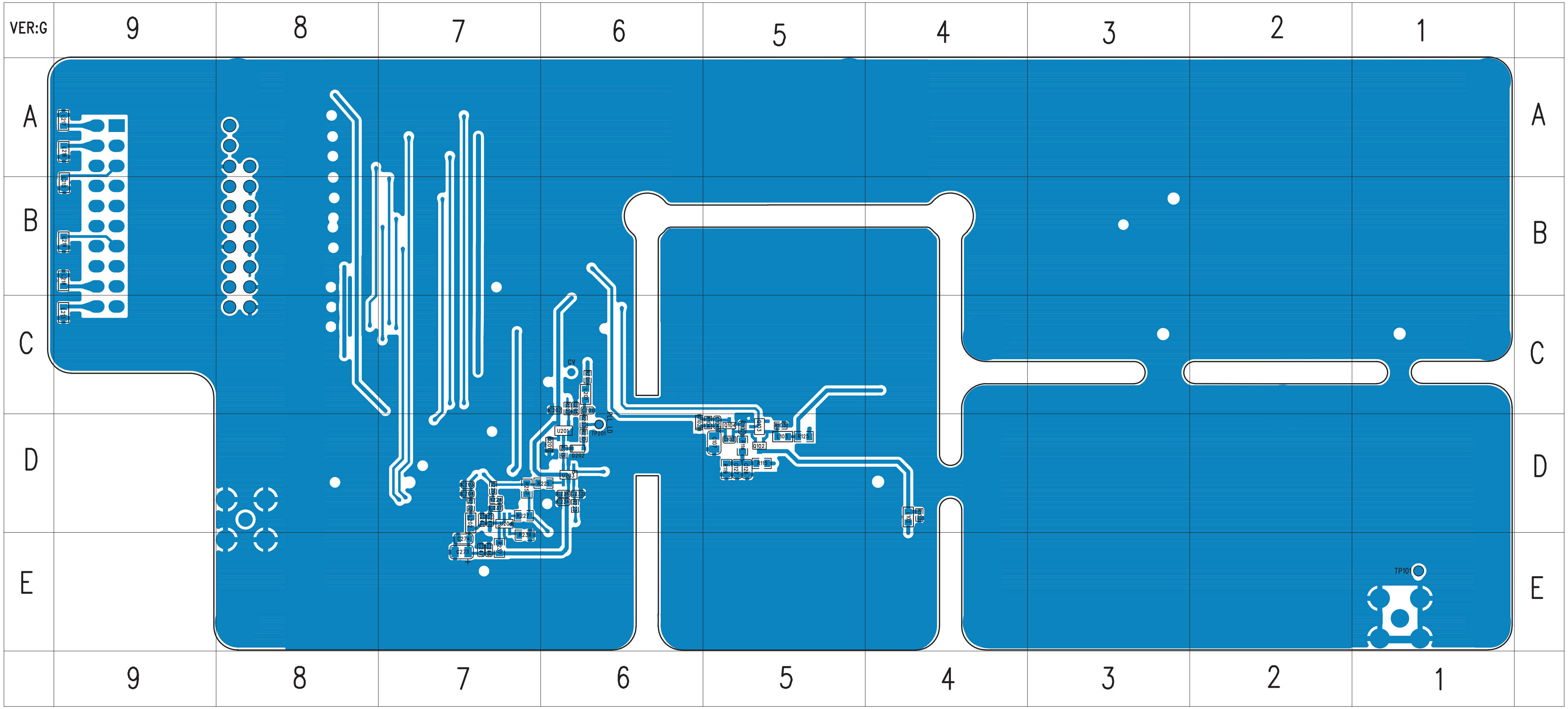
RD98X PCB View (PA Board)
Bottom Layer



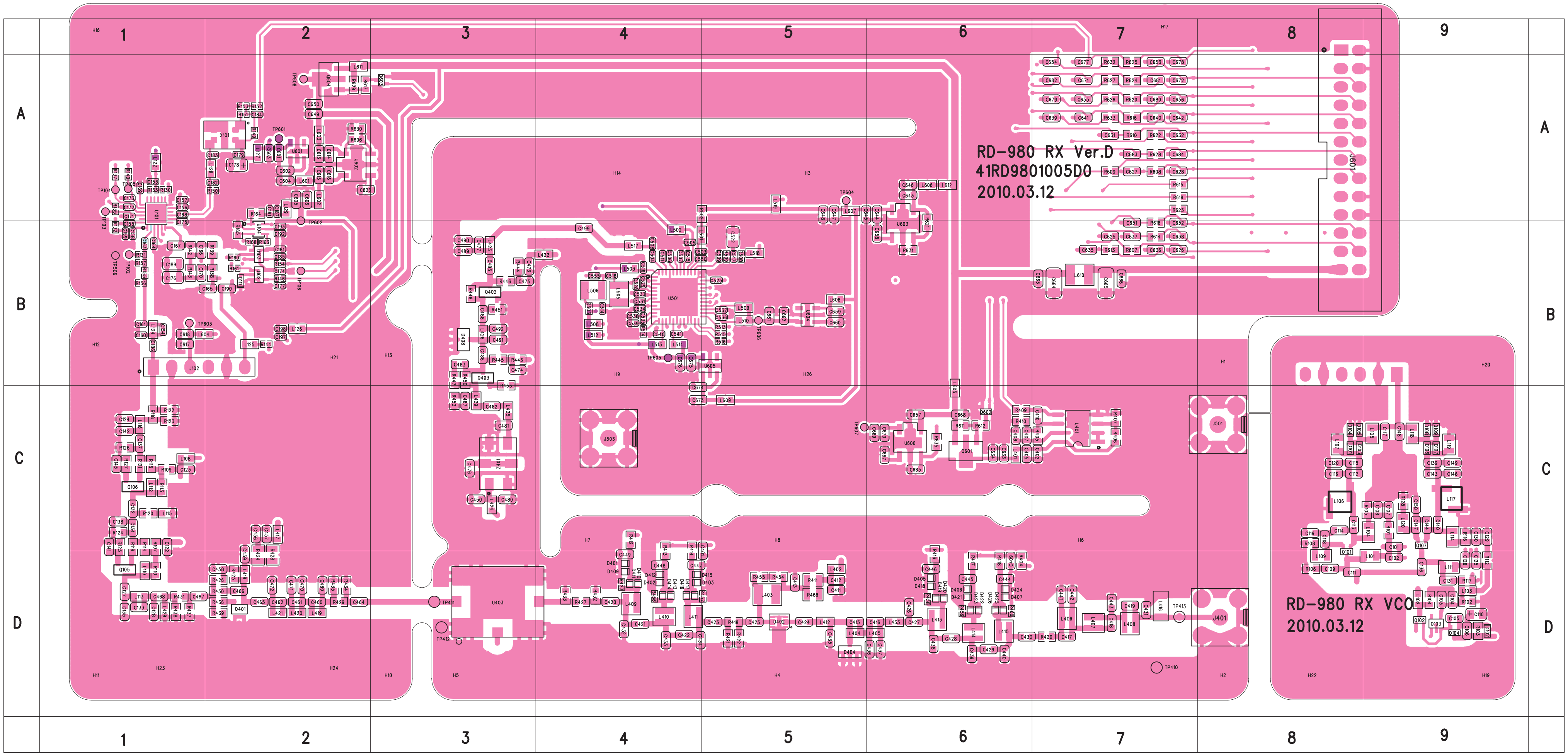
RD98X PCB View (Exciter Board)
Top Layer



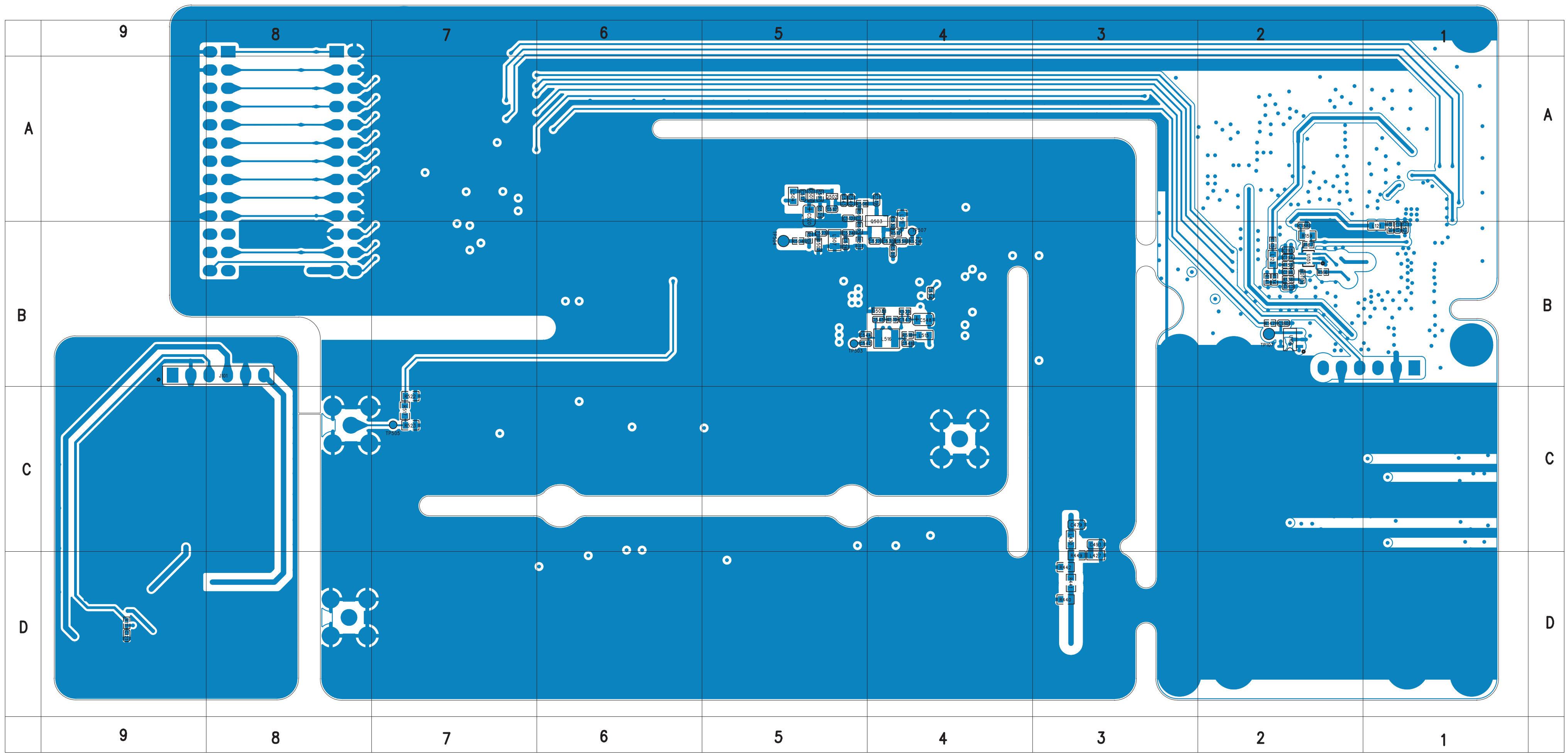
RD98X PCB View (Exciter Board)
Bottom Layer



RD98X PCB View (RX Board)
Top Layer

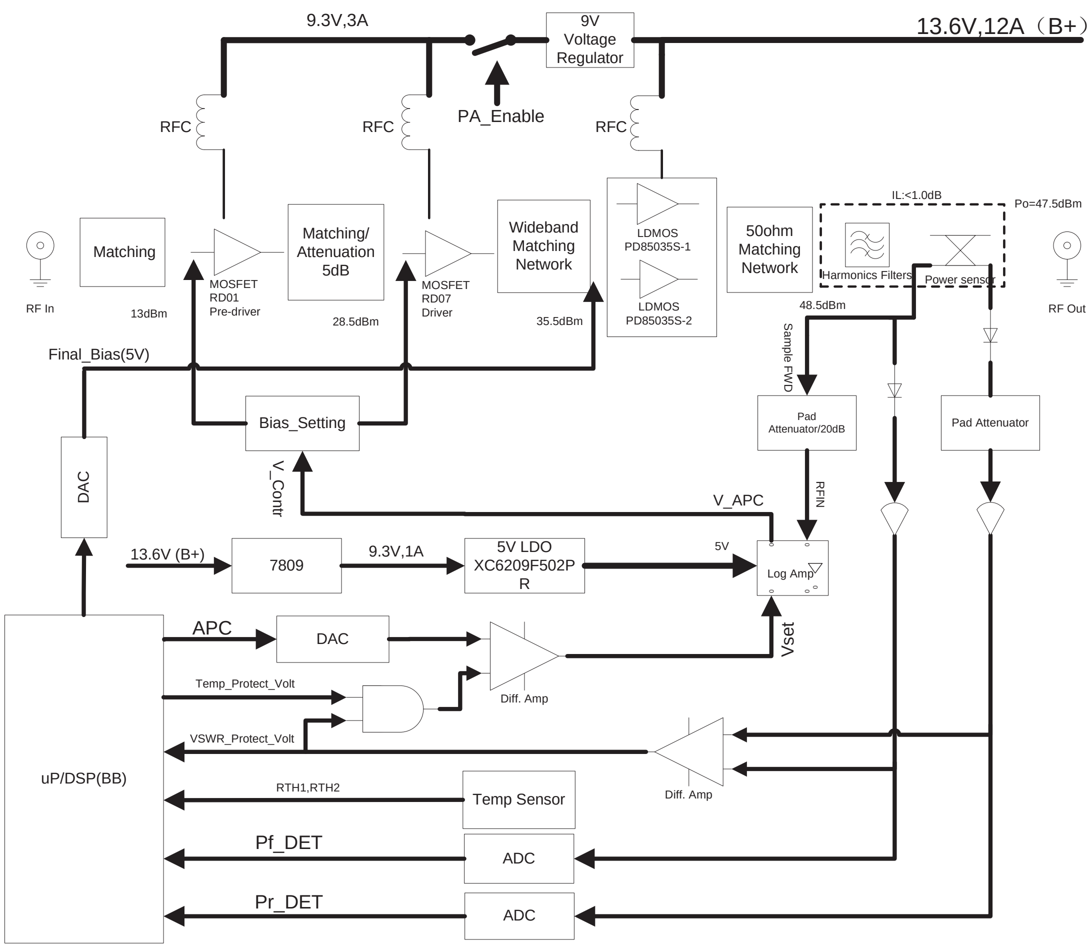


RD98X PCB View (RX Board)
Bottom Layer

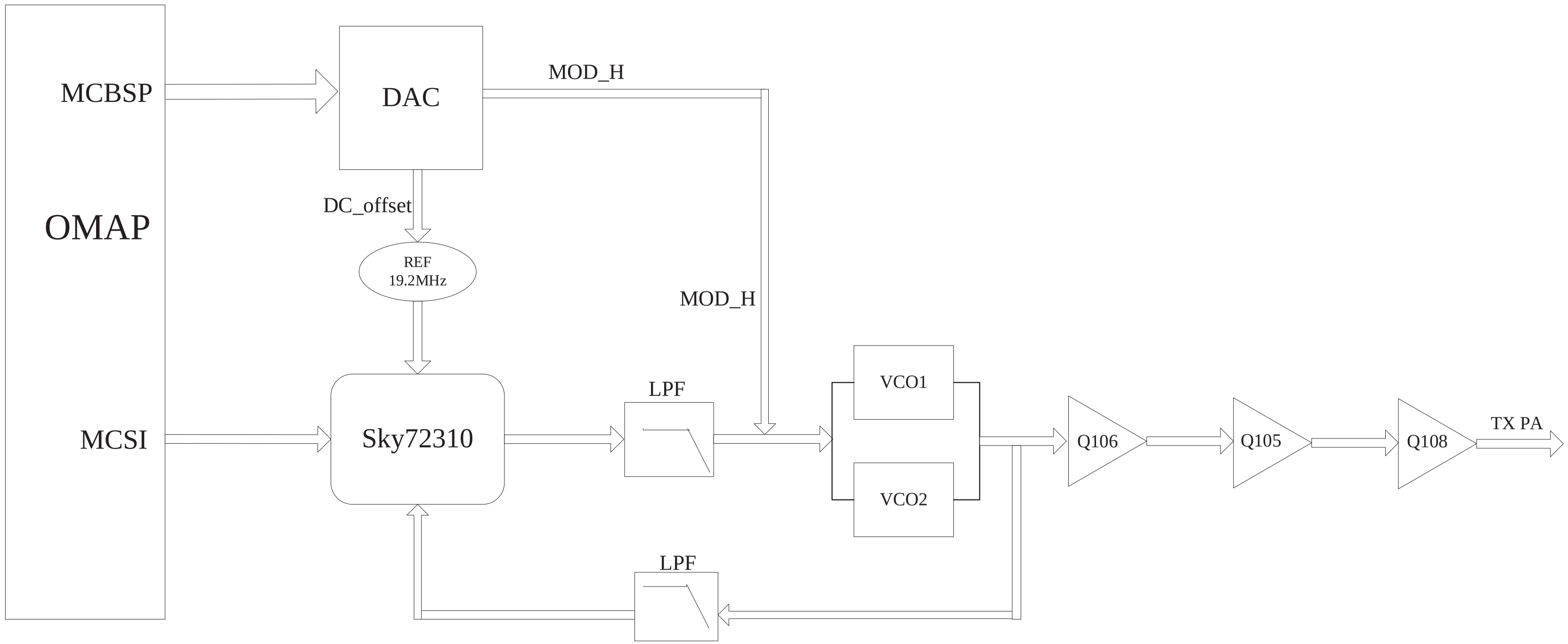


9.5 Block Diagram

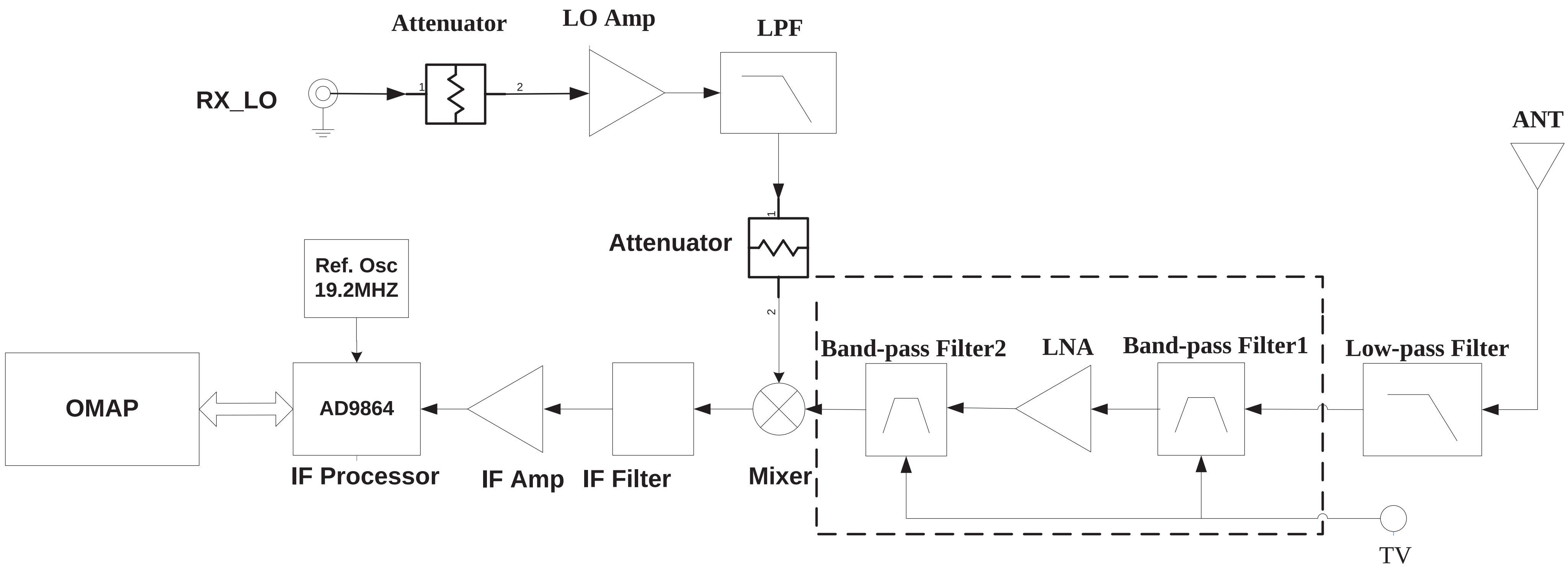
RD98X Block Diagram (PA Section)



RD98X Block Diagram (Exciter Section)

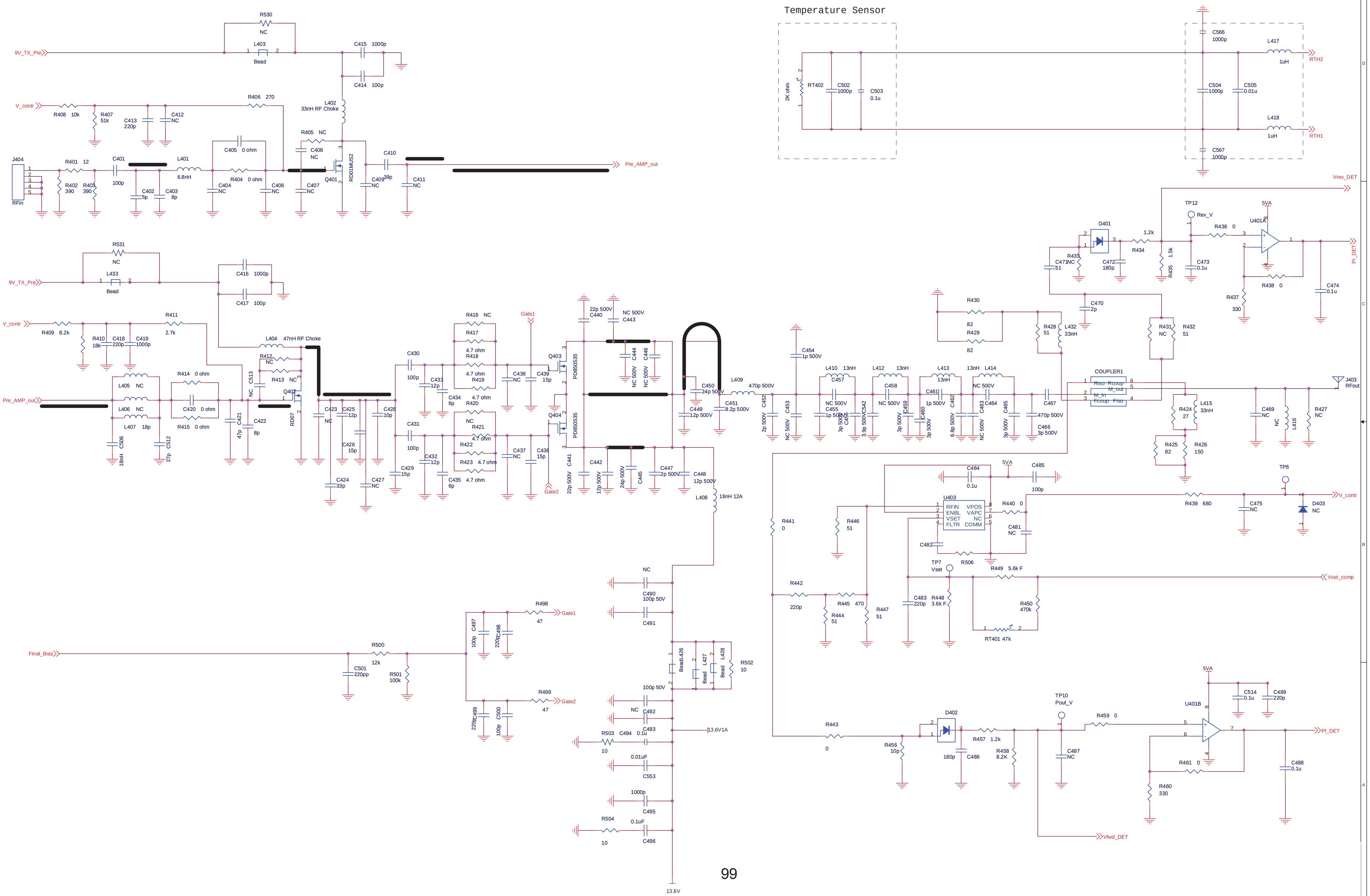


RD98X Block Diagram (RX Section)

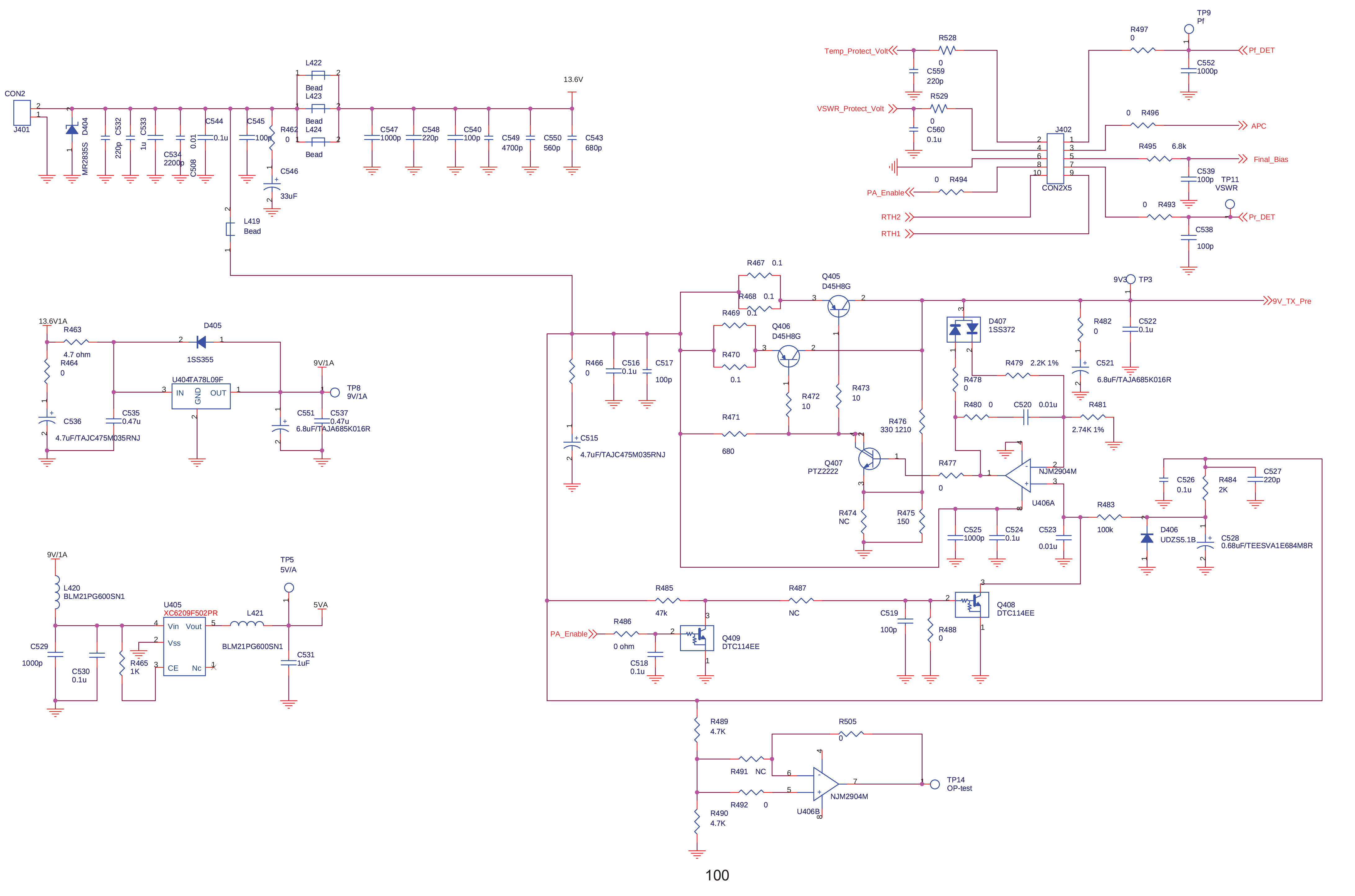


9.6 Schematic Diagram

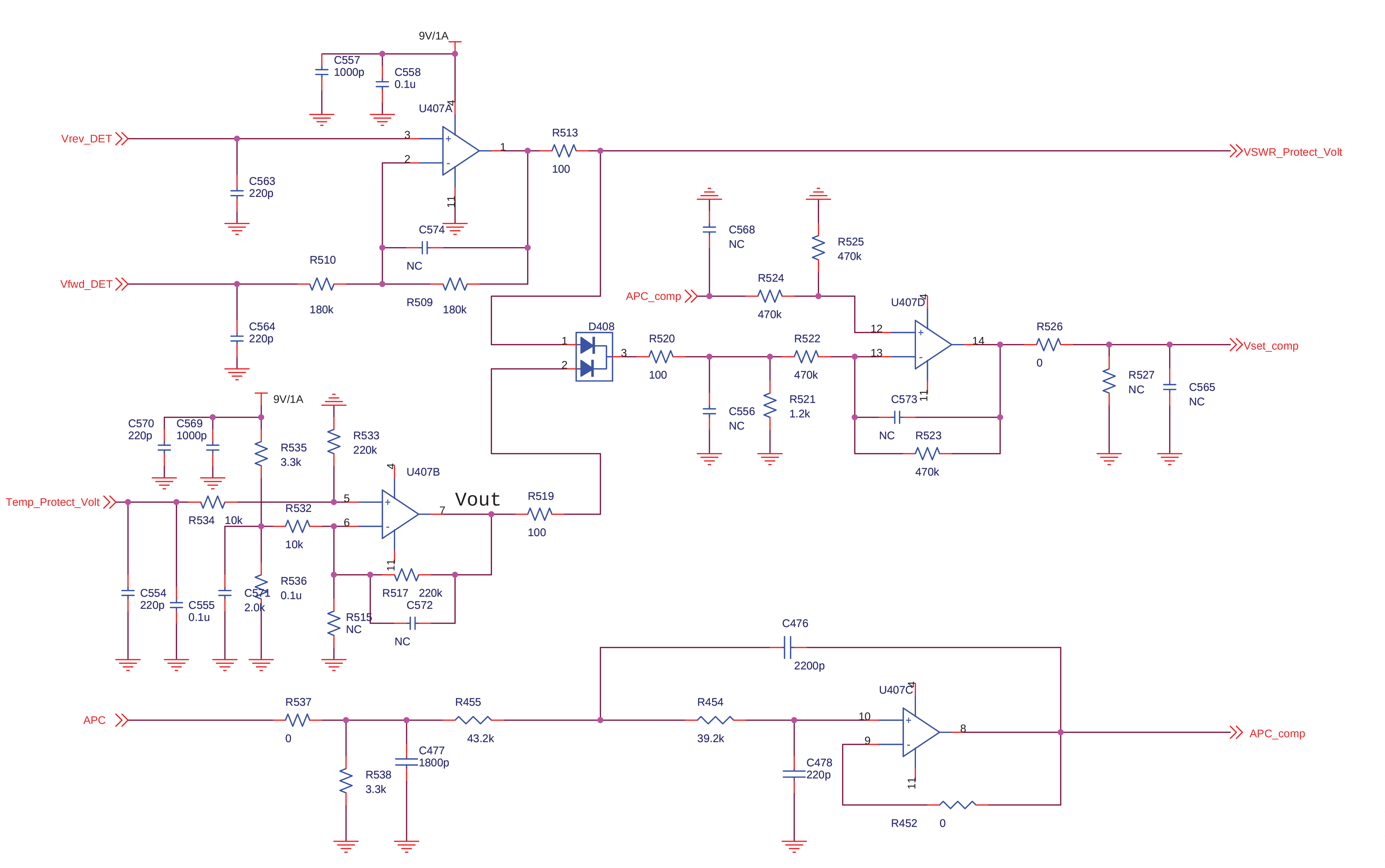
RD98X Schematic Diagram (PA Circuit)



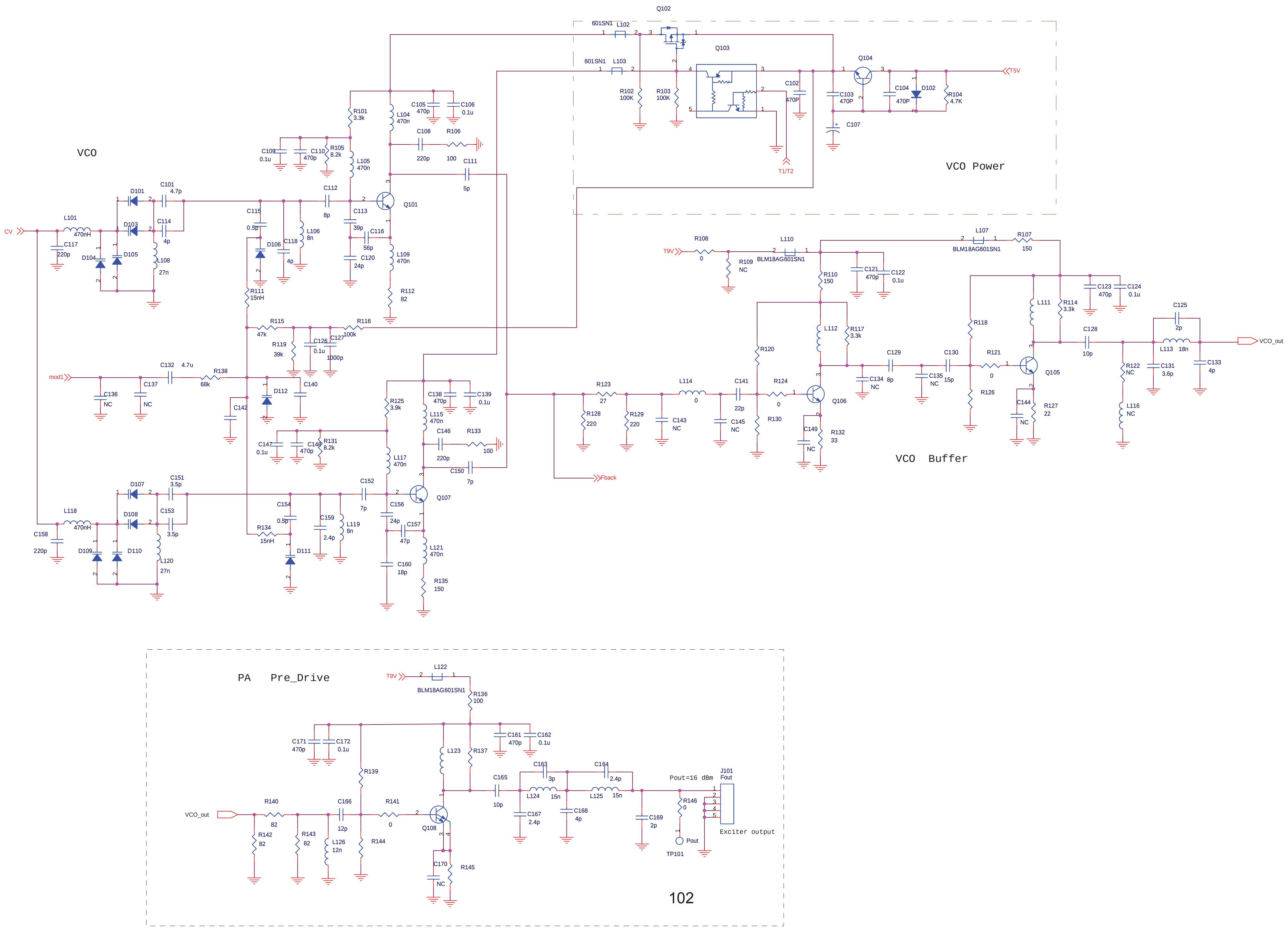
RD98X Schematic Diagram (TX_Power Supply Circuit)



RD98X Schematic Diagram (TX_VSWR & Temperature Protection Circuit)

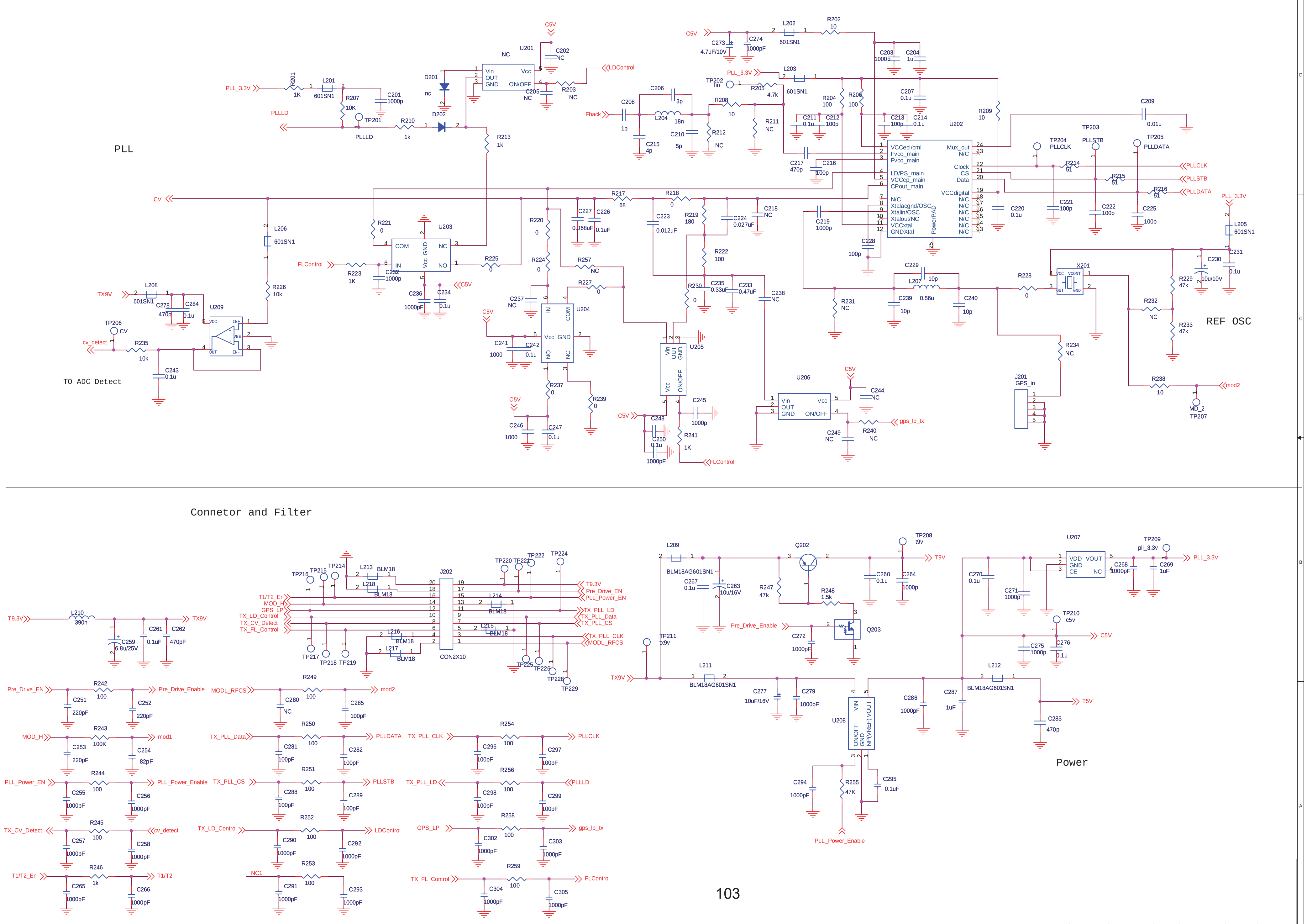


RD98X Schematic Diagram (Exciter_VCO/Buffer/Pre_Driver Circuit)

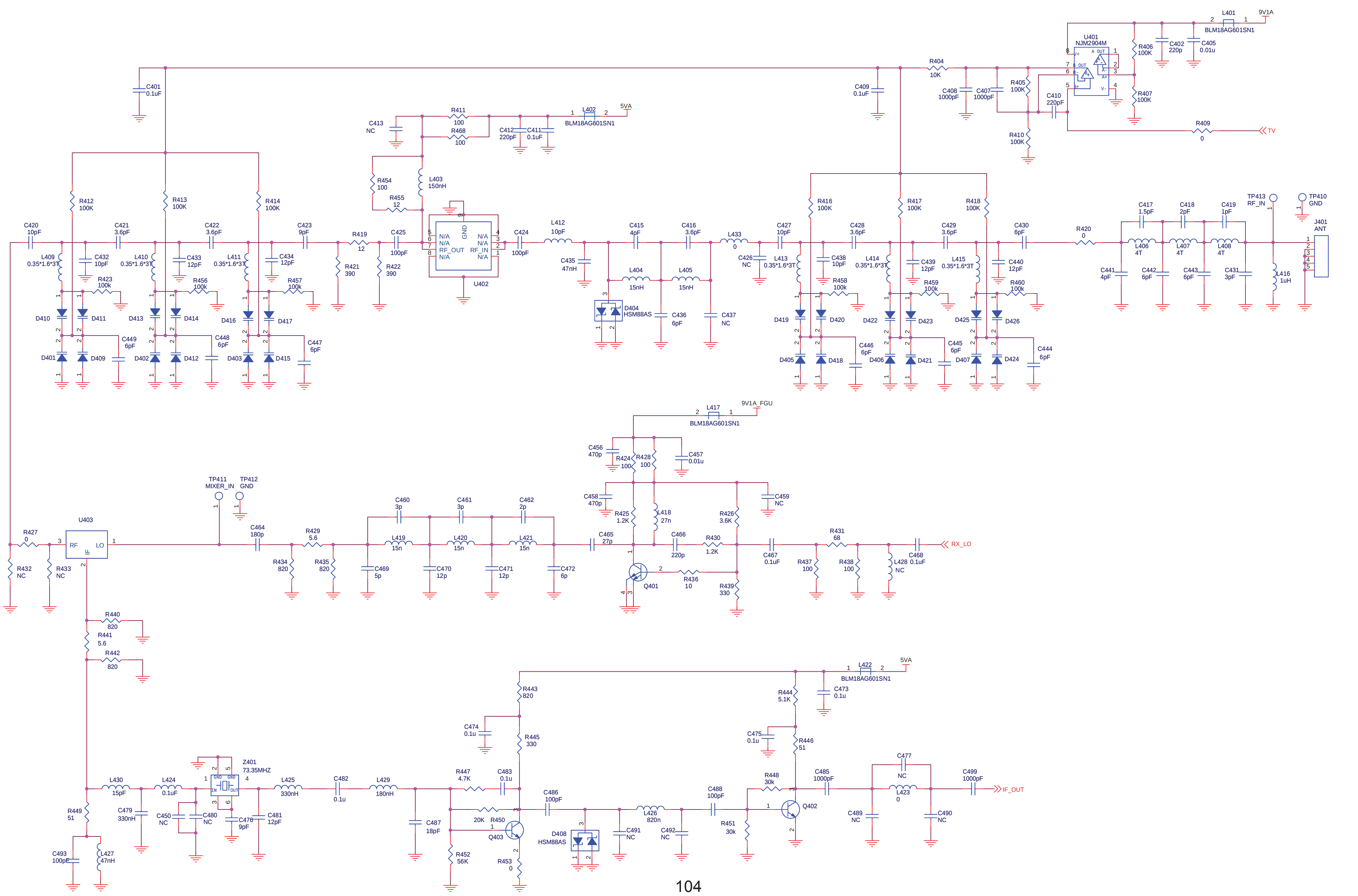


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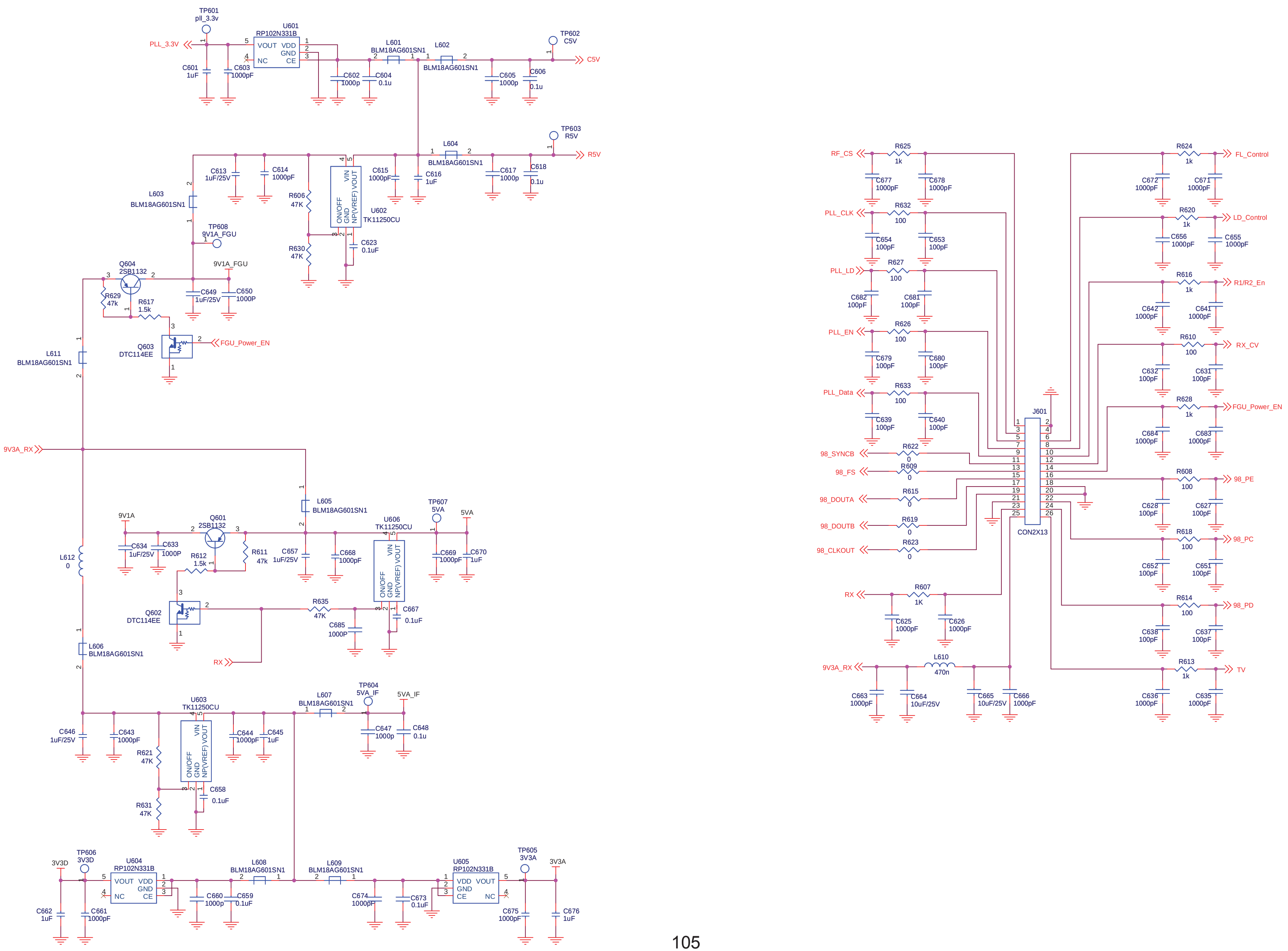
RD98X Schematic Diagram (Exciter_PLL/Power Supply/Connector Circuit)



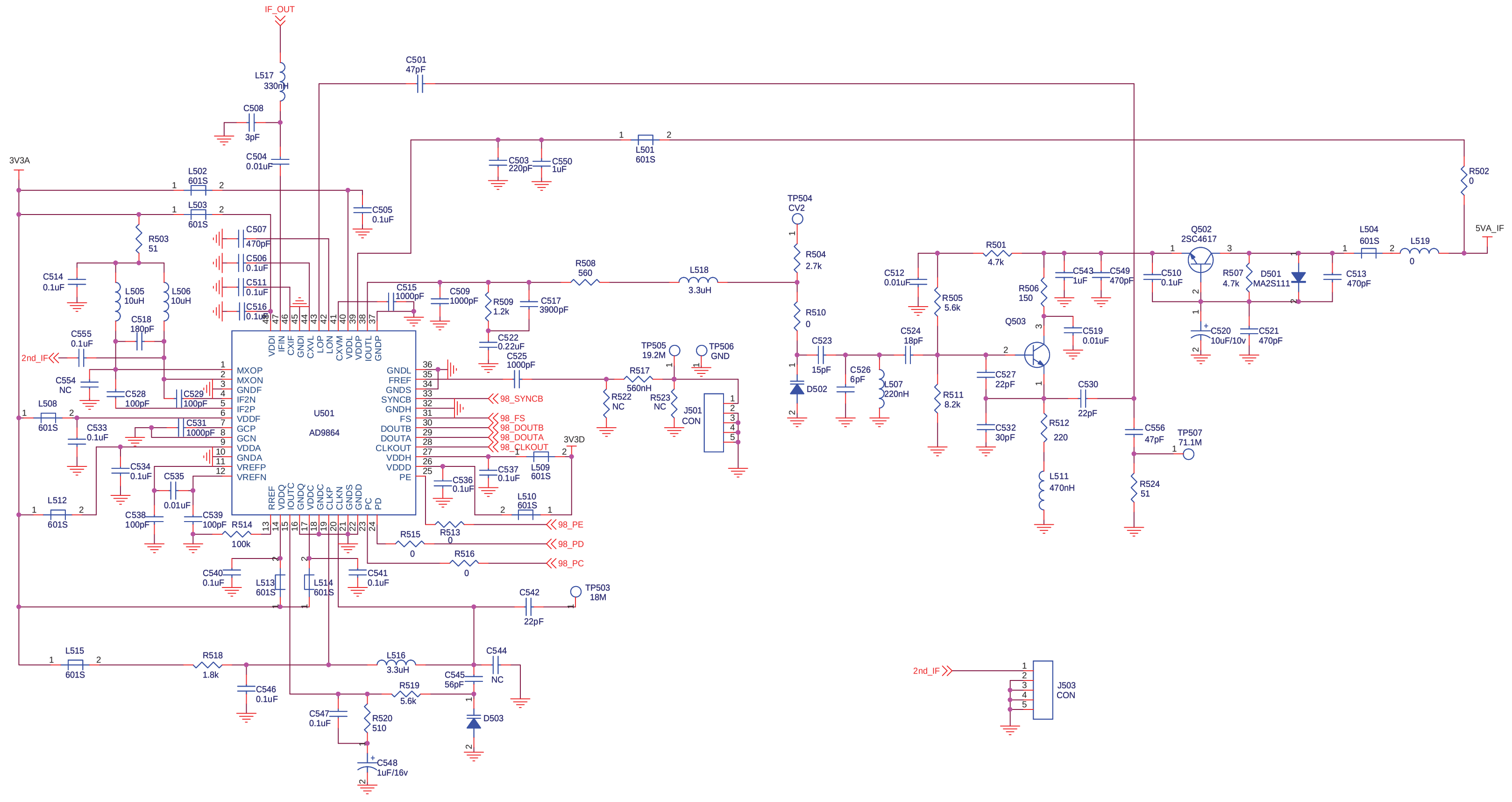
RD98X Schematic Diagram (RX_Front-end Circuit)



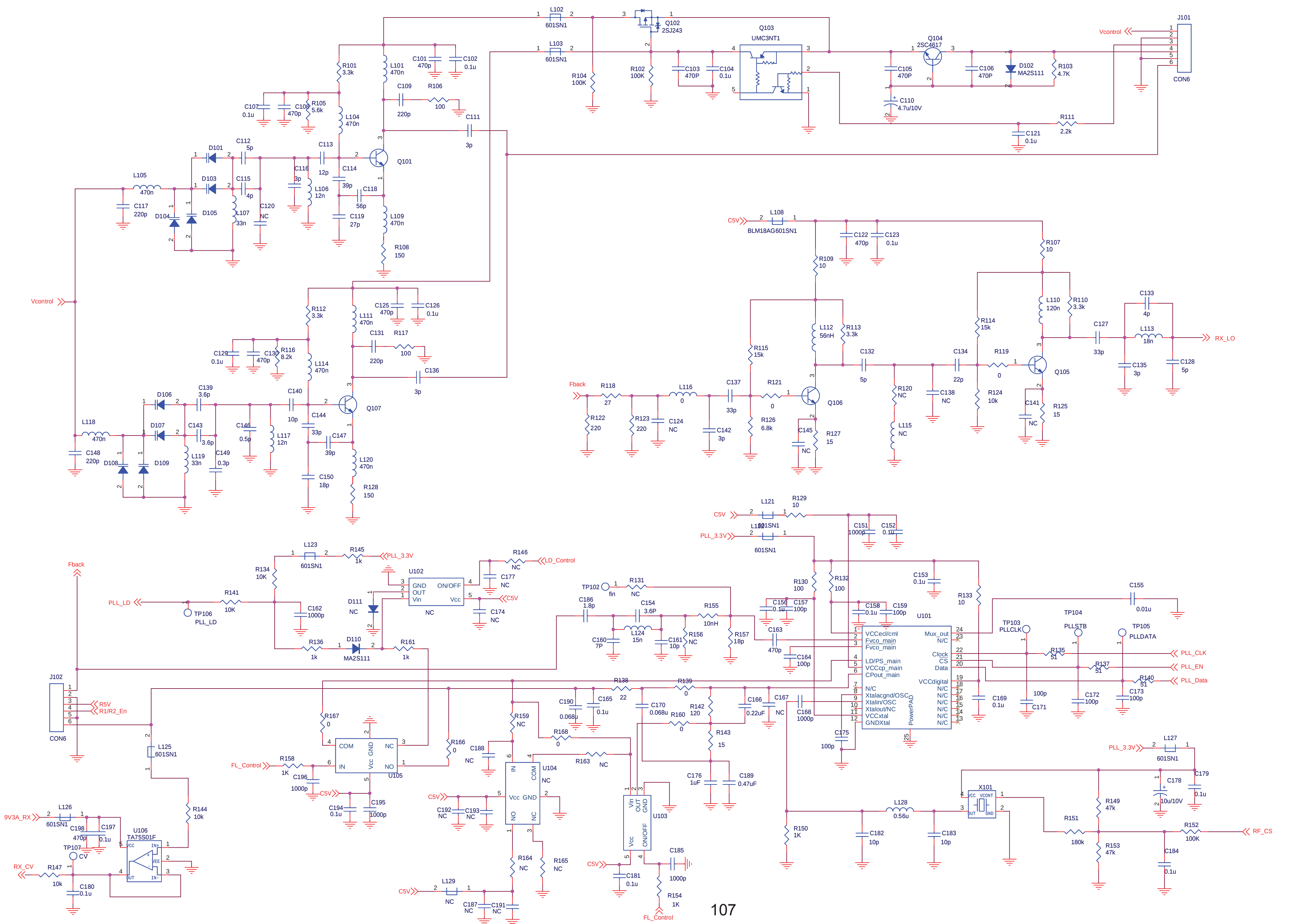
RD98X Schematic Diagram (RX_Power Supply Circuit)



RD98X Schematic Diagram (RX_AD9864 Circuit)



RD98X Schematic Diagram (RX_Frequency Synthesizer Circuit)



9.7 Parts List

Power Amplifier

No.	Ref. No.	Part No.	Description
1	C401	3101071010000	100PF
2	C414	3101071010000	100PF
3	C417	3101071010000	100PF
4	C492	3101071010000	100PF
5	C497	3101071010000	100PF
6	C500	3101071010000	100PF
7	C517	3101071010000	100PF
8	C540	3101071010000	100PF
9	C545	3101071010000	100PF
10	C402	3101060500010	5PF
11	C403	3101070800010	8PF
12	C421	3101070800010	8PF
13	C422	3101074700000	47PF
14	C413	3101062210000	220PF
15	C478	3101062210000	220PF
16	C489	3101062210000	220PF
17	C501	3101062210000	220PF
18	C527	3101062210000	220PF
19	C554	3101062210000	220PF
20	C559	3101062210000	220PF
21	C563	3101062210000	220PF
22	C564	3101062210000	220PF
23	C570	3101062210000	220PF
24	C415	3101071020010	1000PF
25	C416	3101071020010	1000PF
26	C419	3101071020010	1000PF
27	C495	3101071020010	1000PF
28	C513	3101071020010	1000PF
29	C525	3101071020010	1000PF
30	C547	3101071020010	1000PF
31	C418	3101072210010	220PF
32	C468	3101072210010	220PF
33	C483	3101072210010	220PF
34	C498	3101072210010	220PF
35	C499	3101072210010	220PF
36	C532	3101072210010	220PF
37	C548	3101072210010	220PF
38	C438	3101071500000	15PF
39	C439	3101071500000	15PF

No.	Ref. No.	Part No.	Description
40	C430	3101371010000	100pF
41	C431	3101371010000	100pF
42	C432	3101081200010	12pF
43	C433	3101081200010	12pF
44	C434	3101080600010	6pF
45	C435	3101080600010	6pF
46	C440	3101372200000	22pF
47	C450	3101372200000	22pF
48	C445	3101371200000	12pF
49	C449	3101371200000	12pF
50	C447	3101372400000	24pF
51	C451	3101372400000	24pF
52	C442	3101370200000	2pF
53	C452	3101370200000	2pF
54	C455	3101370200000	2pF
55	C448	3101378290000	8.2pF
56	C454	3101370100000	1pF
57	C461	3101370100000	1pF
58	C456	3101370300000	3pF
59	C459	3101370300000	3pF
60	C460	3101370300000	3pF
61	C465	3101370300000	3pF
62	C466	3101370300000	3pF
63	C462	3101376890000	6.8pF
64	C576	3101374710000	470pF
65	C473	3101071040000	0.1UF
66	C494	3101071040000	0.1UF
67	C496	3101071040000	0.1UF
68	C516	3101071040000	0.1UF
69	C522	3101071040000	0.1UF
70	C524	3101071040000	0.1UF
71	C544	3101071040000	0.1UF
72	C474	3101061040010	0.1UF
73	C484	3101061040010	0.1UF
74	C488	3101061040010	0.1UF
75	C503	3101061040010	0.1UF
76	C514	3101061040010	0.1UF
77	C518	3101061040010	0.1UF
78	C526	3101061040010	0.1UF
79	C530	3101061040010	0.1UF
80	C555	3101061040010	0.1UF
81	C558	3101061040010	0.1UF

No.	Ref. No.	Part No.	Description
82	C560	3101061040010	0.1UF
83	R536	3101061040010	0.1UF
84	C485	3101061010010	100PF
85	C519	3101061010010	100PF
86	C538	3101061010010	100PF
87	C539	3101061010010	100PF
88	C476	3101062220010	2200PF
89	C408	3101061020000	1000PF
90	C471	3101061020000	1000PF
91	C502	3101061020000	1000PF
92	C504	3101061020000	1000PF
93	C529	3101061020000	1000PF
94	C552	3101061020000	1000PF
95	C557	3101061020000	1000PF
96	C566	3101061020000	1000PF
97	C567	3101061020000	1000PF
98	C569	3101061020000	1000PF
99	C491	3101084710010	470pF
100	C505	3101061030010	0.01UF
101	C520	3101061030011	0.02UF
102	C523	3101061030012	0.03UF
103	L439	3210306180000	18nH
104	C508	3101071030010	0.01UF
105	C553	3101071030010	0.01UF
106	C512	3101072700000	27PF
107	C515	3104994750020	4.7uF
108	C536	3104994750020	4.7uF
109	C521	3104086850030	6.8UF
110	C551	3104086850030	6.8UF
111	C528	3104086840020	0.68UF
112	C531	3101061050000	1UF
113	C533	3101071050160	1UF
114	C534	3101072220010	2200PF
115	C535	3101064740000	0.47UF
116	C537	3101064740000	0.47UF
117	C542	3101373990000	3.9pF
118	C546	3104993360000	33uF
119	D401	3609030000000	DIODE
120	D402	3609030000000	DIODE
121	D405	3303010500040	DIODE
122	D406	3302030500030	DIODE
123	D407	3303010500290	DIODE

No.	Ref. No.	Part No.	Description
124	D408	3303030100010	DIODE
125	L401	3212107689000	6.8nH
126	L415	3210108330000	33nH
127	L432	3210108330000	33nH
128	L403	3221513600000	Ferrite bead
129	L419	3221513600000	Ferrite bead
130	L422	3221513600000	Ferrite bead
131	L423	3221513600000	Ferrite bead
132	L424	3221513600000	Ferrite bead
133	L426	3221513600000	Ferrite bead
134	L427	3221513600000	Ferrite bead
135	L428	3221513600000	Ferrite bead
136	L433	3221513600000	Ferrite bead
137	L404	3231351680000	16nH
138	C578	3101071800000	18PF
139	L408	3231803050000	37nH
140	L410	3233099160000	16nH
141	L412	3233099160000	16nH
142	L413	3233099160000	16nH
143	L414	3233099160000	16nH
144	L417	3213306102000	1uH
145	L418	3213306102000	1uH
146	L420	3221507600000	Ferrite bead
147	L421	3221507600000	Ferrite bead
148	Q401	3504990000010	PA IC
149	Q402	3504990000040	PA IC
150	Q408	3403008000010	Transistor
151	Q409	3403008000010	Transistor
152	R455	3001064730000	47KΩ
153	R485	3001064730000	47KΩ
154	RT401	3001064730000	47KΩ
155	R401	3001071200000	12Ω
156	R402	3001073910000	390Ω
157	R403	3001073910000	390Ω
158	R406	3001061010000	100Ω
159	R513	3001061010000	100Ω
160	R519	3001061010000	100Ω
161	R407	3001068220000	8.2KΩ
162	R506	3001061030000	10KΩ
163	R532	3001061030000	10KΩ
164	R534	3001061030000	10KΩ
165	C444	3101371500000	15pF

No.	Ref. No.	Part No.	Description
166	R410	3001075120000	5.1KΩ
167	R434	3001071220000	1.2KΩ
168	R457	3001071220000	1.2KΩ
169	R411	3001074700000	47Ω
170	R408	3001065120000	5.1KΩ
171	R417	3001084790000	4.7Ω
172	R418	3001084790000	4.7Ω
173	R419	3001084790000	4.7Ω
174	R421	3001084790000	4.7Ω
175	R422	3001084790000	4.7Ω
176	R423	3001084790000	4.7Ω
177	R463	3001084790000	4.7Ω
178	R424	3001082700000	27Ω
179	R425	3001088200010	82Ω
180	R426	3001088200010	82Ω
181	R429	3001088200010	82Ω
182	R430	3001088200010	82Ω
183	R432	3001075100000	51Ω
184	R444	3001075100000	51Ω
185	R446	3001075100000	51Ω
186	R447	3001075100000	51Ω
187	R539	3001075100000	51Ω
188	R443	3001071000000	10Ω
189	R472	3001071000000	10Ω
190	R473	3001071000000	10Ω
191	R503	3001071000000	10Ω
192	R504	3001071000000	10Ω
193	R436	3001060000000	0Ω
194	R438	3001060000000	0Ω
195	R440	3001060000000	0Ω
196	R452	3001060000000	0Ω
197	R459	3001060000000	0Ω
198	R461	3001060000000	0Ω
199	R478	3001060000000	0Ω
200	R480	3001060000000	0Ω
201	R486	3001060000000	0Ω
202	R487	3001060000000	0Ω
203	R496	3001060000000	0Ω
204	R526	3001060000000	0Ω
205	R537	3001060000000	0Ω
206	L425	3210306560000	56nH
207	L429	3210306560000	56nH

No.	Ref. No.	Part No.	Description
208	L430	3210306560000	56nH
209	L431	3210306560000	56nH
210	L438	3210306560000	56nH
211	R404	3001070000000	0Ω
212	R414	3001070000001	1Ω
213	R415	3001070000002	2Ω
214	R441	3001070000003	3Ω
215	R462	3001070000004	4Ω
216	R464	3001070000005	5Ω
217	R466	3001070000006	6Ω
218	R477	3001070000007	7Ω
219	R482	3001070000008	8Ω
220	R492	3001070000009	9Ω
221	R505	3001070000010	10Ω
222	R540	3001070000011	11Ω
223	R541	3001070000012	12Ω
224	R448	3001063620000	3.6KΩ
225	R450	3001064740000	470KΩ
226	R522	3001064740000	470KΩ
227	R523	3001064740000	470KΩ
228	R524	3001064740000	470KΩ
229	R525	3001064740000	470KΩ
230	R454	3001063930000	39KΩ
231	R465	3001061020000	1KΩ
232	R467	3001080190000	0.1Ω
233	R468	3001080190000	0.1Ω
234	R469	3001080190000	0.1Ω
235	R470	3001080190000	0.1Ω
236	R471	3001076810000	680Ω
237	R475	3001161510010	150Ω
238	R479	3001062220000	2.2KΩ
239	R481	3001062720030	2.7KΩ
240	R483	3001071040010	100KΩ
241	R501	3001071040010	100KΩ
242	C571	3001062020030	2KΩ
243	R484	3001062020030	2KΩ
244	R489	3001074720010	4.7KΩ
245	R490	3001074720010	4.7KΩ
246	R502	3001161000010	10Ω
247	R509	3001061840000	180KΩ
248	R510	3001061840000	180KΩ
249	U401	3605008005070	PA IC

No.	Ref. No.	Part No.	Description
250	U403	3623025000000	Wave detector
251	U404	3608002005490	Zener diode
252	U405	3608015000060	Zener diode
253	U406	3605008001690	Operational amplifier
254	U407	3605010000020	Operational amplifier
255	E1	6201868000000	Heat sink
257	C426	3101073300000	33PF
258	C429	3101073300000	33PF
259	R520	3001061010040	100Ω
260	R521	3001061220000	1.2KΩ
261	R449	3001065620000	5.6KΩ
262	R476	3001083310010	330Ω
263	R405	3001064710000	470Ω
264	R535	3001063320000	3.3KΩ
265	R538	3001063320000	3.3KΩ
266	R517	3001062240000	220KΩ
267	R533	3001062240000	220KΩ
268	R437	3001063310000	330Ω
269	R460	3001063310000	330Ω
270	L402	3231351660000	16nH
271	R439	3001066810010	680Ω
272	C482	3101063920000	3900PF
273	R495	3001066820000	6.8KΩ
274	R428	3001085100000	51Ω
275	R498	3001085100000	51Ω
276	R499	3001085100000	51Ω
277	R547	3001085100000	51Ω
278	R548	3001085100000	51Ω
279	C477	3101061820000	1800PF
280			PCB
281	R542	3001080000000	0Ω
282	D404	3302060000000	Diode
283	R500	3001071230010	12KΩ
284	R412	3001074710000	470Ω
285	R445	3001074710000	470Ω
286	C470	3101070200010	2pF
287	C575	3101071000020	10pF
288	C472	3101071810000	180pF
289	C486	3101071810000	180pF
290	C410	3101073900020	39pF
291	C549	3101074720030	4700pF
292	C550	3101075610010	560pF

No.	Ref. No.	Part No.	Description
293	C543	3101076810000	680pF
294	C479	3101081020010	1000pF
295	C480	3101081020010	1000pF
296	R543	3001111510000	150Ω
297	R544	3001111510000	150Ω
298	R435	3001071520000	1.5KΩ
299	R409	3001078220010	8.2KΩ
300	R458	3001078220010	8.2KΩ
301	Q407	3404999000020	NPN transistor
302	E3	6202416000000	Heat sink
303	Q403	3601017000000	Transistor
304	Q404	3601017000000	Transistor

Exciter Board

No.	Ref. No.	Part No.	Description
1	R220	3001050000000	0Ω
2	R224	3001050000000	0Ω
3	R228	3001050000000	0Ω
4	L114	3001060000000	0Ω
5	R108	3001060000000	0Ω
6	R121	3001060000000	0Ω
7	R124	3001060000000	0Ω
8	R141	3001060000000	0Ω
9	R145	3001060000000	0Ω
10	R146	3001060000000	0Ω
11	R218	3001060000000	0Ω
12	R221	3001060000000	0Ω
13	R225	3001060000000	0Ω
14	R227	3001060000000	0Ω
15	R230	3001060000000	0Ω
16	R237	3001060000000	0Ω
17	R239	3001060000000	0Ω
18	R202	3001051000000	10Ω
19	R209	3001051000000	10Ω
20	R238	3001051000000	10Ω
21	R208	3001061000000	10Ω
22	R127	3001062200000	22Ω
23	R123	3001062700000	27Ω
24	R132	3001063300000	33Ω
25	R214	3001055100020	51Ω
26	R215	3001055100020	51Ω
27	R216	3001055100020	51Ω
28	R217	3001066800000	68Ω
29	R112	3001068200000	82Ω
30	R140	3001068200000	82Ω
31	R142	3001068200000	82Ω
32	R143	3001068200000	82Ω
33	R204	3001051010000	100Ω
34	R206	3001051010000	100Ω
35	R106	3001061010000	100Ω
36	R133	3001061010000	100Ω
37	R136	3001061010000	100Ω
38	R222	3001061010000	100Ω
39	R242	3001061010000	100Ω
40	R244	3001061010000	100Ω
41	R245	3001061010000	100Ω

No.	Ref. No.	Part No.	Description
42	R249	3001061010000	100Ω
43	R250	3001061010000	100Ω
44	R251	3001061010000	100Ω
45	R252	3001061010000	100Ω
46	R253	3001061010000	100Ω
47	R254	3001061010000	100Ω
48	R256	3001061010000	100Ω
49	R258	3001061010000	100Ω
50	R259	3001061010000	100Ω
51	R107	3001061510000	150Ω
52	R110	3001061510000	150Ω
53	R135	3001061510000	150Ω
54	R219	3001061810000	180Ω
55	R128	3001062210000	220Ω
56	R129	3001062210000	220Ω
57	R201	3001051020000	1KΩ
58	R210	3001051020000	1KΩ
59	R213	3001051020000	1KΩ
60	R223	3001051020000	1KΩ
61	R241	3001051020000	1KΩ
62	R246	3001061020010	1KΩ
63	R248	3001061520000	1.5K
64	R144	3001062720000	2.7K
65	R101	3001063320000	3.3K
66	R114	3001063320000	3.3K
67	R117	3001063320000	3.3K
68	R137	3001063320000	3.3K
69	R125	3001063920000	3.9K
70	R104	3001054720000	4.7K
71	R205	3001054720000	4.7K
72	R130	3001066820000	6.8K
73	R105	3001068220000	8.2K
74	R126	3001068220000	8.2K
75	R131	3001068220000	8.2K
76	R207	3001051030000	10KΩ
77	R226	3001051030000	10KΩ
78	R235	3001051030000	10KΩ
79	R118	3001061530010	15KΩ
80	R120	3001061530010	15KΩ
81	R139	3001061530010	15KΩ
82	R119	3001063930010	39KΩ
83	R229	3001054730010	47KΩ

No.	Ref. No.	Part No.	Description
84	R233	3001054730010	47KΩ
85	R115	3001064730000	47KΩ
86	R247	3001064730000	47KΩ
87	R255	3001064730000	47KΩ
88	R138	3001066830000	68KΩ
89	R102	3001051040000	100KΩ
90	R103	3001051040000	100KΩ
91	R116	3001061040010	100KΩ
92	R243	3001061040000	100KΩ
93	C115	3101060590010	0.5p
94	C154	3101060590010	0.5p
95	C208	3101060100010	1p
96	C125	3101060200010	2p
97	C169	3101060200010	2p
98	C159	3101062490000	2.4p
99	C164	3101062490000	2.4p
100	C167	3101062490000	2.4p
101	C163	3101060300010	3p
102	C206	3101060300010	3p
103	C151	3101063590000	3.5p
104	C153	3101063590000	3.5p
105	C131	3101063690000	3.6p
106	C114	3101060400010	4p
107	C118	3101060400010	4p
108	C133	3101060400010	4p
109	C168	3101060400010	4p
110	C215	3101060400010	4p
111	C101	3101064790010	4.7p
112	C111	3101060500010	5p
113	C210	3101060500010	5p
114	C150	3101060700020	7p
115	C152	3101060700020	7p
116	C112	3101060800010	8p
117	C129	3101060800010	8p
118	C128	3101061000000	10p
119	C165	3101061000000	10p
120	C229	3101061000000	10p
121	C239	3101061000000	10p
122	C240	3101061000000	10p
123	C166	3101061200000	12p
124	C130	3101061500010	15p
125	C160	3101061800000	18p

No.	Ref. No.	Part No.	Description
126	C141	3101062200010	22p
127	C120	3101062400010	24p
128	C156	3101062400010	24p
129	C113	3101063900000	39p
130	C157	3101064700000	47p
131	C116	3101065600000	56p
132	C254	3101068200000	82p
133	C212	3101051010030	100p
134	C213	3101051010030	100p
135	C216	3101051010030	100p
136	C221	3101051010030	100p
137	C222	3101051010030	100p
138	C225	3101051010030	100p
139	C228	3101051010030	100p
140	C281	3101061010010	100p
141	C282	3101061010010	100p
142	C285	3101061010010	100p
143	C288	3101061010010	100p
144	C289	3101061010010	100p
145	C296	3101061010010	100p
146	C297	3101061010010	100p
147	C298	3101061010010	100p
148	C299	3101061010010	100p
149	C108	3101062210000	220p
150	C117	3101062210000	220p
151	C146	3101062210000	220p
152	C158	3101062210000	220p
153	C251	3101062210000	220p
154	C252	3101062210000	220p
155	C253	3101062210000	220p
156	C102	3101054710010	470p
157	C103	3101054710010	470p
158	C104	3101054710010	470p
159	C278	3101054710010	470p
160	C283	3101054710010	470p
161	C105	3101064710000	470p
162	C110	3101064710000	470p
163	C121	3101064710000	470p
164	C123	3101064710000	470p
165	C138	3101064710000	470p
166	C148	3101064710000	470p
167	C161	3101064710000	470p

No.	Ref. No.	Part No.	Description
168	C171	3101064710000	470p
169	C217	3101064710000	470p
170	C262	3101064710000	470p
171	C201	3101051020010	1000p
172	C203	3101051020010	1000p
173	C219	3101051020010	1000p
174	C232	3101051020010	1000p
175	C236	3101051020010	1000p
176	C241	3101051020010	1000p
177	C245	3101051020010	1000p
178	C246	3101051020010	1000p
179	C250	3101051020010	1000p
180	C127	3101061020000	1000p
181	C255	3101061020000	1000p
182	C256	3101061020000	1000p
183	C257	3101061020000	1000p
184	C258	3101061020000	1000p
185	C264	3101061020000	1000p
186	C265	3101061020000	1000p
187	C266	3101061020000	1000p
188	C268	3101061020000	1000p
189	C271	3101061020000	1000p
190	C272	3101061020000	1000p
191	C274	3101061020000	1000p
192	C275	3101061020000	1000p
193	C279	3101061020000	1000p
194	C286	3101061020000	1000p
195	C290	3101061020000	1000p
196	C291	3101061020000	1000p
197	C292	3101061020000	1000p
198	C293	3101061020000	1000p
199	C294	3101061020000	1000p
200	C302	3101061020000	1000p
201	C303	3101061020000	1000p
202	C304	3101061020000	1000p
203	C305	3101061020000	1000p
204	C209	3101051030020	0.01u
205	C223	3101061230000	0.012u
206	C224	3101062730000	0.027u
207	C227	3101066830000	0.068u
208	C207	3101051040010	0.1u
209	C211	3101051040010	0.1u

No.	Ref. No.	Part No.	Description
210	C214	3101051040010	0.1u
211	C220	3101051040010	0.1u
212	C231	3101051040010	0.1u
213	C234	3101051040010	0.1u
214	C242	3101051040010	0.1u
215	C243	3101051040010	0.1u
216	C247	3101051040010	0.1u
217	C248	3101051040010	0.1u
218	C267	3101051040010	0.1u
219	C284	3101051040010	0.1u
220	C106	3101061040020	0.1u
221	C109	3101061040020	0.1u
222	C122	3101061040020	0.1u
223	C124	3101061040020	0.1u
224	C126	3101061040020	0.1u
225	C139	3101061040020	0.1u
226	C147	3101061040020	0.1u
227	C162	3101061040020	0.1u
228	C172	3101061040020	0.1u
229	C226	3101061040020	0.1u
230	C260	3101061040020	0.1u
231	C261	3101061040020	0.1u
232	C270	3101061040020	0.1u
233	C276	3101061040020	0.1u
234	C295	3101061040020	0.1u
235	C235	3101073340000	0.33u
236	C233	3101074740000	0.47u
237	C269	3101061050000	1u
238	C287	3101061050000	1u
239	C204	3101051050160	1u
240	C132	3101074750000	4.7u
241	C107	3104074750070	4.7u
242	C273	3104074750070	4.7u
243	C259	3104086850030	6.8u
244	C263	3104081060120	10u
245	C277	3104081060120	10u
246	C230	3104071060070	10u
247	L106	3237199080000	8nH
248	L119	3237199080000	8nH
249	L126	3217106120010	12nH
250	L124	3210106150000	15nH
251	L125	3210106150000	15nH

No.	Ref. No.	Part No.	Description
252	R111	3210306150000	15nH
253	R134	3210306150000	15nH
254	L113	3210306180000	18nH
255	L204	3210306180000	18nH
256	L108	3214307270010	27nH
257	L120	3214307270010	27nH
258	L123	3210306330000	33nH
259	L111	3217106560000	56nH
260	L112	3217106560000	56nH
261	L210	3217607391000	390nH
262	L101	3217107471010	470nH
263	L104	3217107471010	470nH
264	L105	3217107471010	470nH
265	L109	3217107471010	470nH
266	L115	3217107471010	470nH
267	L117	3217107471010	470nH
268	L118	3217107471010	470nH
269	L121	3217107471010	470nH
270	L207	3213306561000	0.56uH
271	L102	3221506601000	Ferrite bead
272	L103	3221506601000	Ferrite bead
273	L107	3221506601000	Ferrite bead
274	L110	3221506601000	Ferrite bead
275	L122	3221506601000	Ferrite bead
276	L201	3221506601000	Ferrite bead
277	L202	3221506601000	Ferrite bead
278	L203	3221506601000	Ferrite bead
279	L205	3221506601000	Ferrite bead
280	L206	3221506601000	Ferrite bead
281	L208	3221506601000	Ferrite bead
282	L209	3221506601000	Ferrite bead
283	L211	3221506601000	Ferrite bead
284	L212	3221506601000	Ferrite bead
285	L213	3221506601000	Ferrite bead
286	L214	3221506601000	Ferrite bead
287	L215	3221506601000	Ferrite bead
288	L216	3221506601000	Ferrite bead
289	L217	3221506601000	Ferrite bead
290	L218	3221506601000	Ferrite bead
291	D101	3304060300050	Varactor
292	D103	3304060300050	Varactor
293	D104	3304060300050	Varactor

No.	Ref. No.	Part No.	Description
294	D105	3304060300050	Varactor
295	D107	3304060300050	Varactor
296	D108	3304060300050	Varactor
297	D109	3304060300050	Varactor
298	D110	3304060300050	Varactor
299	D112	3304010100890	Varactor
300	D102	3303240000000	Switching diode
301	D202	3303240000000	Switching diode
302	Q101	3408002000080	NPN transistor
303	Q107	3408002000080	NPN transistor
304	Q105	3404006000000	NPN transistor
305	Q106	3404006000000	NPN transistor
306	Q108	3404999000000	NPN transistor
307	Q103	3499000000150	Composite transistor
308	Q104	3403003000060	NPN transistor
309	Q202	3403002000000	PNP transistor
310	Q203	3403008000010	Bias resistor transistor
311	Q102	3503010000010	P-MOSFET
312	U202	3604019000000	PLL IC
313	U203	3616010000000	Switch IC
314	U204	3616010000000	Switch IC
315	U207	3608006000000	Power management IC
316	U208	3608020000000	Power management IC
317	U209	3605002057090	Operational amplifier
318	U205	3616059000000	Switch IC
319	X201	3701019250060	Temperature compensated crystal oscillator

Receiver Board

No.	Ref. No.	Part No.	Description
1	R141	3001050000000	0Ω
2	R160	3001050000000	0Ω
3	R166	3001050000000	0Ω
4	R167	3001050000000	0Ω
5	R168	3001050000000	0Ω
6	R510	3001050000000	0Ω
7	R513	3001050000000	0Ω
8	R515	3001050000000	0Ω
9	R516	3001050000000	0Ω
10	L116	3001060000000	0Ω
11	L423	3001060000000	0Ω
12	L433	3001060000000	0Ω
13	L519	3001060000000	0Ω
14	L612	3001060000000	0Ω
15	R119	3001060000000	0Ω
16	R121	3001060000000	0Ω
17	R139	3001060000000	0Ω
18	R409	3001060000000	0Ω
19	R420	3001060000000	0Ω
20	R427	3001060000000	0Ω
21	R453	3001060000000	0Ω
22	R502	3001060000000	0Ω
23	R609	3001060000000	0Ω
24	R615	3001060000000	0Ω
25	R619	3001060000000	0Ω
26	R622	3001060000000	0Ω
27	R623	3001060000000	0Ω
28	R129	3001051000000	10Ω
29	R133	3001051000000	10Ω
30	R419	3001061200000	12Ω
31	R455	3001061200000	12Ω
32	R421	3001063910000	390Ω
33	R422	3001063910000	390Ω
34	R107	3001061000000	10Ω
35	R109	3001061000000	10Ω
36	R436	3001061000000	10Ω
37	R130	3001051010000	100Ω
38	R132	3001051010000	100Ω
39	R106	3001061010000	100Ω
40	R117	3001061010000	100Ω
41	R437	3001061010000	100Ω

No.	Ref. No.	Part No.	Description
42	R438	3001061010000	100Ω
43	R454	3001061010000	100Ω
44	R608	3001061010000	100Ω
45	R610	3001061010000	100Ω
46	R614	3001061010000	100Ω
47	R618	3001061010000	100Ω
48	R626	3001061010000	100Ω
49	R627	3001061010000	100Ω
50	R632	3001061010000	100Ω
51	R633	3001061010000	100Ω
52	R136	3001051020000	1KΩ
53	R145	3001051020000	1KΩ
54	R150	3001051020000	1KΩ
55	R154	3001051020000	1KΩ
56	R158	3001051020000	1KΩ
57	R161	3001051020000	1KΩ
58	R607	3001061020010	1KΩ
59	R613	3001061020010	1KΩ
60	R616	3001061020010	1KΩ
61	R620	3001061020010	1KΩ
62	R624	3001061020010	1KΩ
63	R625	3001061020010	1KΩ
64	R628	3001061020010	1KΩ
65	R134	3001051030000	10KΩ
66	R144	3001051030000	10KΩ
67	R147	3001051030000	10KΩ
68	R124	3001061030010	10KΩ
69	R404	3001061030010	10KΩ
70	R152	3001051040000	100KΩ
71	R423	3001051040000	100KΩ
72	R456	3001051040000	100KΩ
73	R457	3001051040000	100KΩ
74	R458	3001051040000	100KΩ
75	R459	3001051040000	100KΩ
76	R460	3001051040000	100KΩ
77	R514	3001051040000	100KΩ
78	R102	3001061040010	100KΩ
79	R104	3001061040010	100KΩ
80	R405	3001061040010	100KΩ
81	R406	3001061040010	100KΩ
82	R407	3001061040010	100KΩ
83	R410	3001061040010	100KΩ

No.	Ref. No.	Part No.	Description
84	R412	3001061040010	100KΩ
85	R413	3001061040010	100KΩ
86	R414	3001061040010	100KΩ
87	R416	3001061040010	100KΩ
88	R417	3001061040010	100KΩ
89	R418	3001061040010	100KΩ
90	R142	3001061210000	120Ω
91	R509	3001051220000	1.2KΩ
92	R425	3001061220000	1.2KΩ
93	R430	3001061220000	1.2KΩ
94	R125	3001061500000	15Ω
95	R127	3001061500000	15Ω
96	R143	3001061500000	15Ω
97	R506	3001051510000	150Ω
98	R612	3001061520000	1.5KΩ
99	R617	3001061520000	1.5KΩ
100	R114	3001061530010	15KΩ
101	R115	3001061530010	15KΩ
102	R518	3001051820000	1.8KΩ
103	R151	3001051840000	180KΩ
104	R450	3001062030000	20KΩ
105	R138	3001062200000	22Ω
106	R122	3001062210000	220Ω
107	R123	3001062210000	220Ω
108	R118	3001062700000	27Ω
109	R108	3001061510000	150Ω
110	R128	3001061510000	150Ω
111	R504	3001052720000	2.7KΩ
112	R448	3001063030000	30KΩ
113	R451	3001063030000	30KΩ
114	R512	3001052210000	220Ω
115	R439	3001063310010	330Ω
116	R445	3001063310010	330Ω
117	R101	3001063320000	3.3KΩ
118	R110	3001063320000	3.3KΩ
119	R112	3001063320000	3.3KΩ
120	R113	3001063320000	3.3KΩ
121	R426	3001063620000	3.6KΩ
122	R501	3001054720000	4.7KΩ
123	R507	3001054720000	4.7KΩ
124	R103	3001064720000	4.7KΩ
125	R447	3001064720000	4.7KΩ

No.	Ref. No.	Part No.	Description
126	R149	3001054730000	47KΩ
127	R153	3001054730000	47KΩ
128	R606	3001064730000	47KΩ
129	R611	3001064730000	47KΩ
130	R621	3001064730000	47KΩ
131	R629	3001064730000	47KΩ
132	R630	3001064730000	47KΩ
133	R631	3001064730000	47KΩ
134	R635	3001064730000	47KΩ
135	R135	3001055100020	51Ω
136	R137	3001055100020	51Ω
137	R140	3001055100020	51Ω
138	R503	3001055100020	51Ω
139	R524	3001055100020	51Ω
140	R446	3001065100000	51Ω
141	R449	3001065100000	51Ω
142	R520	3001055110000	510Ω
143	R444	3001065120000	5.1KΩ
144	R429	3001065690000	5.6Ω
145	R441	3001065690000	5.6Ω
146	R508	3001055610000	560Ω
147	R505	3001055620000	5.6KΩ
148	R519	3001055620000	5.6KΩ
149	R452	3001065630000	56KΩ
150	R126	3001066820000	6.8KΩ
151	R434	3001068210010	820Ω
152	R435	3001068210010	820Ω
153	R440	3001068210010	820Ω
154	R442	3001068210010	820Ω
155	R443	3001068210010	820Ω
156	R411	3001071010000	100Ω
157	R424	3001071010000	100Ω
158	R428	3001071010000	100Ω
159	R468	3001071010000	100Ω
160	R111	3001052220000	2.2KΩ
161	R431	3001066800000	68Ω
162	R511	3001058220000	8.2KΩ
163	R105	3001065620000	5.6KΩ
164	R116	3001068220000	8.2KΩ
165	C146	3101060590010	0.5PF
166	C161	3101051000020	10PF
167	C182	3101051000020	10PF

No.	Ref. No.	Part No.	Description
168	C183	3101051000020	10PF
169	C419	3101060100010	1PF
170	C140	3101061000000	10PF
171	C420	3101061000000	10PF
172	C427	3101061000000	10PF
173	C432	3101061000000	10PF
174	C438	3101061000000	10PF
175	L412	3101061000000	10PF
176	C157	3101051010030	100PF
177	C159	3101051010030	100PF
178	C164	3101051010030	100PF
179	C171	3101051010030	100PF
180	C172	3101051010030	100PF
181	C173	3101051010030	100PF
182	C175	3101051010030	100PF
183	C528	3101051010030	100PF
184	C529	3101051010030	100PF
185	C538	3101051010030	100PF
186	C539	3101051010030	100PF
187	C424	3101061010010	100PF
188	C425	3101061010010	100PF
189	C464	3101061010010	100PF
190	C486	3101061010010	100PF
191	C488	3101061010010	100PF
192	C493	3101061010010	100PF
193	C627	3101061010010	100PF
194	C628	3101061010010	100PF
195	C631	3101061010010	100PF
196	C632	3101061010010	100PF
197	C637	3101061010010	100PF
198	C638	3101061010010	100PF
199	C639	3101061010010	100PF
200	C640	3101061010010	100PF
201	C651	3101061010010	100PF
202	C652	3101061010010	100PF
203	C653	3101061010010	100PF
204	C654	3101061010010	100PF
205	C679	3101061010010	100PF
206	C680	3101061010010	100PF
207	C681	3101061010010	100PF
208	C682	3101061010010	100PF
209	C151	3101051020010	1000PF

No.	Ref. No.	Part No.	Description
210	C162	3101051020010	1000PF
211	C168	3101051020010	1000PF
212	C185	3101051020010	1000PF
213	C195	3101051020010	1000PF
214	C196	3101051020010	1000PF
215	C509	3101051020010	1000PF
216	C515	3101051020010	1000PF
217	C525	3101051020010	1000PF
218	C531	3101051020010	1000PF
219	C407	3101061020000	1000PF
220	C408	3101061020000	1000PF
221	C485	3101061020000	1000PF
222	C499	3101061020000	1000PF
223	C602	3101061020000	1000PF
224	C603	3101061020000	1000PF
225	C605	3101061020000	1000PF
226	C614	3101061020000	1000PF
227	C615	3101061020000	1000PF
228	C617	3101061020000	1000PF
229	C625	3101061020000	1000PF
230	C626	3101061020000	1000PF
231	C633	3101061020000	1000PF
232	C635	3101061020000	1000PF
233	C636	3101061020000	1000PF
234	C641	3101061020000	1000PF
235	C642	3101061020000	1000PF
236	C643	3101061020000	1000PF
237	C644	3101061020000	1000PF
238	C647	3101061020000	1000PF
239	C650	3101061020000	1000PF
240	C655	3101061020000	1000PF
241	C656	3101061020000	1000PF
242	C660	3101061020000	1000PF
243	C661	3101061020000	1000PF
244	C663	3101061020000	1000PF
245	C666	3101061020000	1000PF
246	C668	3101061020000	1000PF
247	C669	3101061020000	1000PF
248	C671	3101061020000	1000PF
249	C672	3101061020000	1000PF
250	C674	3101061020000	1000PF
251	C675	3101061020000	1000PF

No.	Ref. No.	Part No.	Description
252	C677	3101061020000	1000PF
253	C678	3101061020000	1000PF
254	C683	3101061020000	1000PF
255	C684	3101061020000	1000PF
256	C685	3101061020000	1000PF
257	C155	3101051030020	0.01UF
258	C504	3101051030020	0.01UF
259	C512	3101051030020	0.01UF
260	C519	3101051030020	0.01UF
261	C535	3101051030020	0.01UF
262	C405	3101061030010	0.01UF
263	C457	3101061030010	0.01UF
264	C152	3101051040060	0.1UF
265	C153	3101051040060	0.1UF
266	C156	3101051040060	0.1UF
267	C158	3101051040060	0.1UF
268	C169	3101051040060	0.1UF
269	C179	3101051040060	0.1UF
270	C180	3101051040060	0.1UF
271	C181	3101051040060	0.1UF
272	C184	3101051040060	0.1UF
273	C194	3101051040060	0.1UF
274	C197	3101051040060	0.1UF
275	C505	3101051040060	0.1UF
276	C506	3101051040060	0.1UF
277	C510	3101051040060	0.1UF
278	C511	3101051040060	0.1UF
279	C514	3101051040060	0.1UF
280	C516	3101051040060	0.1UF
281	C533	3101051040060	0.1UF
282	C534	3101051040060	0.1UF
283	C536	3101051040060	0.1UF
284	C537	3101051040060	0.1UF
285	C540	3101051040060	0.1UF
286	C541	3101051040060	0.1UF
287	C546	3101051040060	0.1UF
288	C547	3101051040060	0.1UF
289	C102	3101061040010	0.1UF
290	C104	3101061040010	0.1UF
291	C107	3101061040010	0.1UF
292	C123	3101061040010	0.1UF
293	C126	3101061040010	0.1UF

No.	Ref. No.	Part No.	Description
294	C129	3101061040010	0.1UF
295	C165	3101061040010	0.1UF
296	C401	3101061040010	0.1UF
297	C409	3101061040010	0.1UF
298	C411	3101061040010	0.1UF
299	C467	3101061040010	0.1UF
300	C468	3101061040010	0.1UF
301	C473	3101061040010	0.1UF
302	C474	3101061040010	0.1UF
303	C475	3101061040010	0.1UF
304	C482	3101061040010	0.1UF
305	C483	3101061040010	0.1UF
306	C604	3101061040010	0.1UF
307	C606	3101061040010	0.1UF
308	C618	3101061040010	0.1UF
309	C623	3101061040010	0.1UF
310	C648	3101061040010	0.1UF
311	C658	3101061040010	0.1UF
312	C659	3101061040010	0.1UF
313	C667	3101061040010	0.1UF
314	C673	3101061040010	0.1UF
315	L424	3101061040010	0.1UF
316	C543	3101051050160	1uF
317	C550	3101051050160	1uF
318	C601	3101061050020	1UF
319	C613	3101061050020	1UF
320	C616	3101061050020	1UF
321	C634	3101061050020	1UF
322	C645	3101061050020	1UF
323	C646	3101061050020	1UF
324	C649	3101061050020	1UF
325	C657	3101061050020	1UF
326	C662	3101061050020	1UF
327	C670	3101061050020	1UF
328	C676	3101061050020	1UF
329	C664	3101081060010	10UF
330	C665	3101081060010	10UF
331	C113	3101061200000	12PF
332	C433	3101061200000	12PF
333	C434	3101061200000	12PF
334	C439	3101061200000	12PF
335	C440	3101061200000	12PF

No.	Ref. No.	Part No.	Description
336	C470	3101061200000	12PF
337	C471	3101061200000	12PF
338	C481	3101061200000	12PF
339	C523	3101051500020	15PF
340	C417	3101061590010	1.5PF
341	C545	3101055600000	56PF
342	C524	3101051800010	18PF
343	R157	3101051800010	18PF
344	C150	3101061800000	18PF
345	C487	3101061800000	18PF
346	C518	3101051810020	180PF
347	C527	3101052200010	22PF
348	C530	3101052200010	22PF
349	C542	3101052200010	22PF
350	C134	3101062200010	22PF
351	C503	3101052210020	220PF
352	C109	3101062210000	220PF
353	C117	3101062210000	220PF
354	C131	3101062210000	220PF
355	C148	3101062210000	220PF
356	C402	3101062210000	220PF
357	C410	3101062210000	220PF
358	C412	3101062210000	220PF
359	C466	3101062210000	220PF
360	C166	3101062240000	0.22UF
361	C119	3101062700010	27PF
362	C465	3101062700010	27PF
363	C111	3101060300010	3PF
364	C116	3101060300010	3PF
365	C135	3101060300010	3PF
366	C136	3101060300010	3PF
367	C142	3101060300010	3PF
368	C431	3101060300010	3PF
369	C460	3101060300010	3PF
370	C461	3101060300010	3PF
371	C508	3101050300000	3PF
372	C532	3101053000010	30PF
373	C139	3101063690000	3.6PF
374	C143	3101063690000	3.6PF
375	C416	3101063690000	3.6PF
376	C421	3101063690000	3.6PF
377	C422	3101063690000	3.6PF

No.	Ref. No.	Part No.	Description
378	C428	3101063690000	3.6PF
379	C429	3101063690000	3.6PF
380	C127	3101063300000	33PF
381	C137	3101063300000	33PF
382	C144	3101063300000	33PF
383	C114	3101063900000	39PF
384	C147	3101063900000	39PF
385	C517	3101053920000	3900PF
386	C115	3101060400010	4PF
387	C133	3101060400010	4PF
388	C415	3101060400010	4PF
389	C441	3101060400010	4PF
390	C501	3101054700010	47PF
391	C556	3101054700010	47PF
392	C163	3101054710010	470PF
393	C198	3101054710010	470PF
394	C507	3101054710010	470PF
395	C513	3101054710010	470PF
396	C521	3101054710010	470PF
397	C549	3101054710010	470PF
398	C101	3101064710000	470PF
399	C103	3101064710000	470PF
400	C105	3101064710000	470PF
401	C106	3101064710000	470PF
402	C108	3101064710000	470PF
403	C122	3101064710000	470PF
404	C125	3101064710000	470PF
405	C130	3101064710000	470PF
406	C456	3101064710000	470PF
407	C458	3101064710000	470PF
408	C112	3101060500010	5PF
409	C128	3101060500010	5PF
410	C132	3101060500010	5PF
411	C469	3101060500010	5PF
412	C423	3101060900010	9PF
413	C476	3101060900010	9PF
414	C118	3101065600000	56PF
415	C526	3101050600010	6PF
416	C430	3101060600010	6PF
417	C436	3101060600010	6PF
418	C442	3101060600010	6PF
419	C443	3101060600010	6PF

No.	Ref. No.	Part No.	Description
420	C444	3101060600010	6PF
421	C445	3101060600010	6PF
422	C446	3101060600010	6PF
423	C447	3101060600010	6PF
424	C448	3101060600010	6PF
425	C449	3101060600010	6PF
426	C472	3101060600010	6PF
427	C170	3101066830000	0.068UF
428	C190	3101066830000	0.068UF
429	C418	3101060200010	2PF
430	C462	3101060200010	2PF
431	C522	3101072240000	0.22UF
432	C176	3101071050160	1UF
433	C548	3104071050070	1UF
434	C189	3101074740000	0.47UF
435	C110	3104074750070	4.7UF
436	C178	3104071060070	10UF
437	C520	3104071060070	10UF
438	C121	3101051040010	0.1UF
439	C149	3101060390000	0.3PF
440	C160	3101050700010	7PF
441	C154	3101053690000	3.6PF
442	C186	3199051890000	1.8PF
443	L430	3101061500010	15PF
444	L110	3217106121000	120nH
445	L112	3210306560000	56nH
446	L416	3210209102010	1uH
447	L505	3213212103000	10uH
448	L506	3213212103000	10uH
449	L106	3237199120000	12.5nH
450	L117	3237199120000	12.5nH
451	R155	3210105100000	10nH
452	L419	3217106150000	15nH
453	L420	3217106150000	15nH
454	L421	3217106150000	15nH
455	L124	3210106150000	15nH
456	L404	3210106150000	15nH
457	L405	3210106150000	15nH
458	L403	3213209151000	150nH
459	L113	3210306180000	18nH
460	L429	3212206181000	180nH
461	L507	3217607221000	220nH

No.	Ref. No.	Part No.	Description
462	L516	3213212332000	3.3uH
463	L418	3210306270000	27nH
464	L107	3217607330000	33nH
465	L119	3217607330000	33nH
466	C479	3210406331000	330nH
467	L425	3210406331000	330nH
468	L517	3210406331000	330nH
469	L518	3213306332000	3.3uH
470	L427	3210306470000	47nH
471	C435	3217106470000	47nH
472	L511	3210406471000	470nH
473	L101	3217107471010	470nH
474	L104	3217107471010	470nH
475	L105	3217107471010	470nH
476	L109	3217107471010	470nH
477	L111	3217107471010	470nH
478	L114	3217107471010	470nH
479	L118	3217107471010	470nH
480	L120	3217107471010	470nH
481	L610	3213209471000	470nH
482	L128	3213306561000	0.56uH
483	R517	3213306561000	0.56uH
484	L102	3221506601000	Ferrite bead
485	L103	3221506601000	Ferrite bead
486	L108	3221506601000	Ferrite bead
487	L121	3221506601000	Ferrite bead
488	L122	3221506601000	Ferrite bead
489	L123	3221506601000	Ferrite bead
490	L125	3221506601000	Ferrite bead
491	L126	3221506601000	Ferrite bead
492	L127	3221506601000	Ferrite bead
493	L401	3221506601000	Ferrite bead
494	L402	3221506601000	Ferrite bead
495	L417	3221506601000	Ferrite bead
496	L422	3221506601000	Ferrite bead
497	L501	3221506601000	Ferrite bead
498	L502	3221506601000	Ferrite bead
499	L503	3221506601000	Ferrite bead
500	L504	3221506601000	Ferrite bead
501	L508	3221506601000	Ferrite bead
502	L509	3221506601000	Ferrite bead
503	L510	3221506601000	Ferrite bead

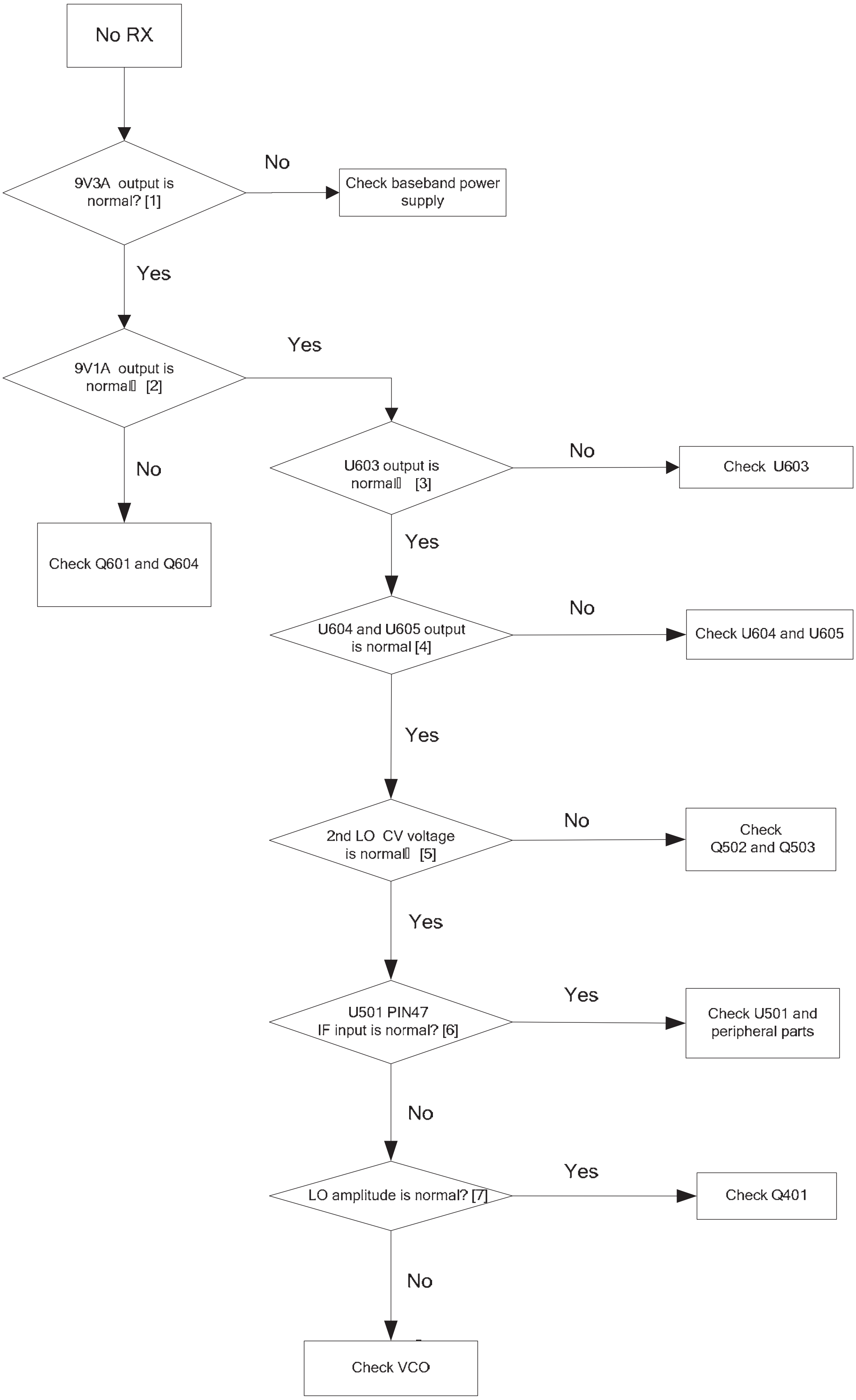
No.	Ref. No.	Part No.	Description
504	L512	3221506601000	Ferrite bead
505	L513	3221506601000	Ferrite bead
506	L514	3221506601000	Ferrite bead
507	L515	3221506601000	Ferrite bead
508	L601	3221506601000	Ferrite bead
509	L602	3221506601000	Ferrite bead
510	L603	3221506601000	Ferrite bead
511	L604	3221506601000	Ferrite bead
512	L605	3221506601000	Ferrite bead
513	L606	3221506601000	Ferrite bead
514	L607	3221506601000	Ferrite bead
515	L608	3221506601000	Ferrite bead
516	L609	3221506601000	Ferrite bead
517	L611	3221506601000	Ferrite bead
518	L426	3213306821000	0.82uH
519	L409	3231301340000	Air-core inductor
520	L410	3231301340000	Air-core inductor
521	L411	3231301340000	Air-core inductor
522	L413	3231301340000	Air-core inductor
523	L414	3231301340000	Air-core inductor
524	L415	3231301340000	Air-core inductor
525	L406	3231351640000	Air-core inductor
526	L407	3231351640000	Air-core inductor
527	L408	3231351640000	Air-core inductor
528	D102	3303240000000	Switching diode
529	D110	3303240000000	Switching diode
530	D501	3303240000000	Switching diode
531	D401	3304010100890	Varactor
532	D402	3304010100890	Varactor
533	D403	3304010100890	Varactor
534	D405	3304010100890	Varactor
535	D406	3304010100890	Varactor
536	D407	3304010100890	Varactor
537	D409	3304010100890	Varactor
538	D410	3304010100890	Varactor
539	D411	3304010100890	Varactor
540	D412	3304010100890	Varactor
541	D413	3304010100890	Varactor
542	D414	3304010100890	Varactor
543	D415	3304010100890	Varactor
544	D416	3304010100890	Varactor
545	D417	3304010100890	Varactor

No.	Ref. No.	Part No.	Description
546	D418	3304010100890	Varactor
547	D419	3304010100890	Varactor
548	D420	3304010100890	Varactor
549	D421	3304010100890	Varactor
550	D422	3304010100890	Varactor
551	D423	3304010100890	Varactor
552	D424	3304010100890	Varactor
553	D425	3304010100890	Varactor
554	D426	3304010100890	Varactor
555	D101	3304060300050	Varactor
556	D103	3304060300050	Varactor
557	D104	3304060300050	Varactor
558	D105	3304060300050	Varactor
559	D106	3304060300050	Varactor
560	D107	3304060300050	Varactor
561	D108	3304060300050	Varactor
562	D109	3304060300050	Varactor
563	D502	3304060300050	Varactor
564	D503	3304060300010	Varactor
565	D404	3399990000260	Rectifier diode
566	D408	3399990000260	Rectifier diode
567	Q102	3503010000010	P-MOSFET
568	Q101	3408002000080	NPN transistor
569	Q107	3408002000080	NPN transistor
570	Q105	3404006000000	NPN transistor
571	Q106	3404006000000	NPN transistor
572	Q402	3404006000000	NPN transistor
573	Q403	3404006000000	NPN transistor
574	Q401	3404999000000	NPN transistor
575	Q104	3403003000060	NPN transistor
576	Q502	3403003000060	NPN transistor
577	Q601	3403002000000	PNP transistor
578	Q604	3403002000000	PNP transistor
579	Q503	3408002000000	NPN transistor
580	Q602	3403008000010	Bias resistor transistor
581	Q603	3403008000010	Bias resistor transistor
582	U402	3601039000060	LNA amplifier
583	U602	3608020000000	Power management IC
584	U603	3608020000000	Power management IC
585	U606	3608020000000	Power management IC
586	U601	3608006000000	Power management IC
587	U604	3608006000000	Power management IC

No.	Ref. No.	Part No.	Description
588	U605	3608006000000	Power management IC
589	U105	3616010000000	Switch IC
590	U101	3604019000000	PLL IC
591	U103	3616059000000	Switch IC
592	U106	3605002057090	Operational amplifier
593	U403	3609014000010	Mixer
594	U501	3603999000000	IF processor IC
595	U401	3605008001690	Operational amplifier
596	Q103	3499000000150	Composite transistor
597	X101	3701019250030	19.2MHZ Temperature compensated crystal oscillator
598	Z401	3802733540030	Crystal filter

9.8 Troubleshooting Flow Chart

Receiver Circuit



Description of Normal Situations:

[1] About 9.3V for receiver board.

[2] About 9.1V for pin 2 of Q601 and Q604.

[3] About 5V for pin 5 of U603.

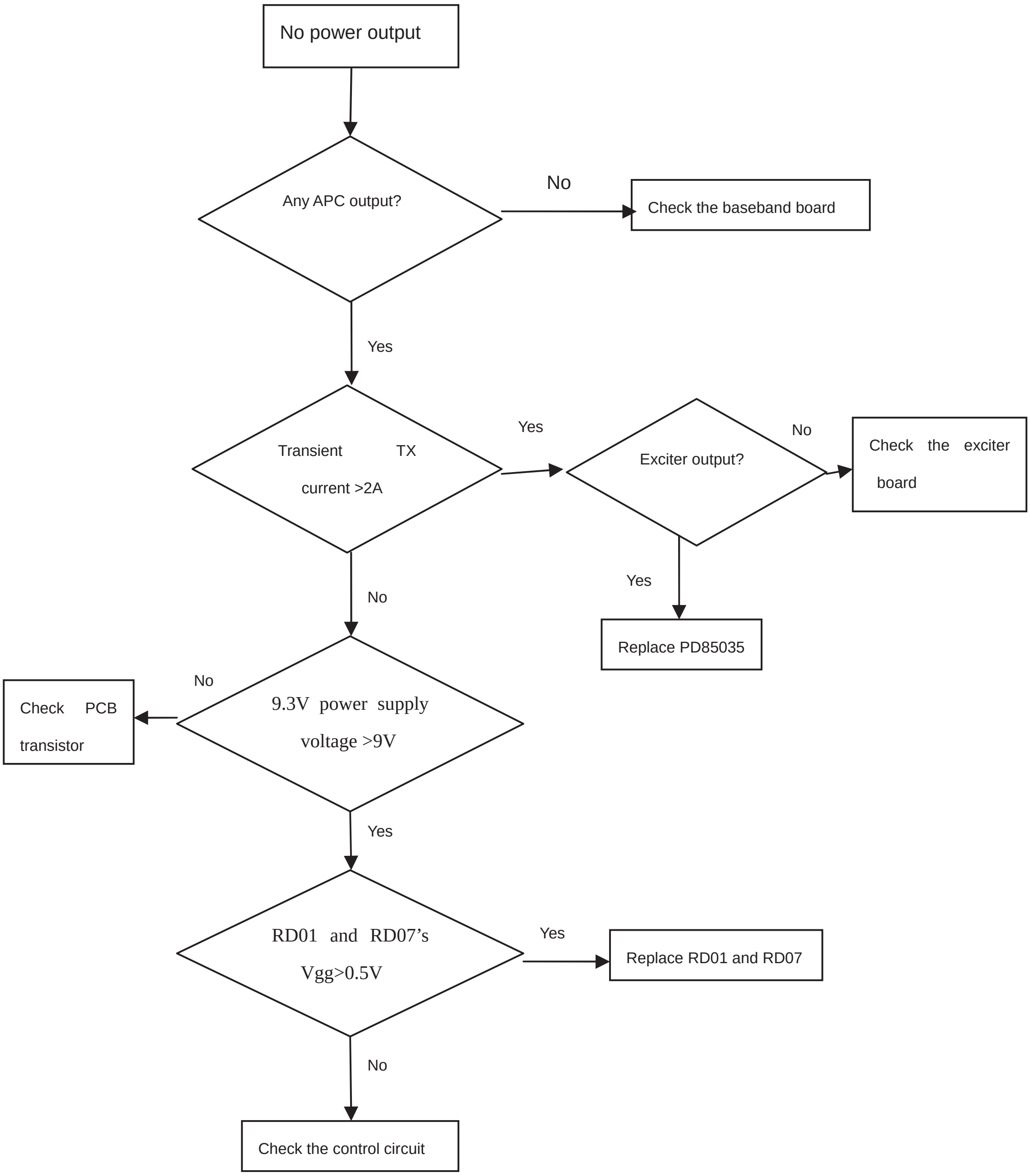
[4] About 3.3V for pin 5 of U604 and U605.

[5] Normal CV voltage is 0.7-1.5V. The test point is TP504.

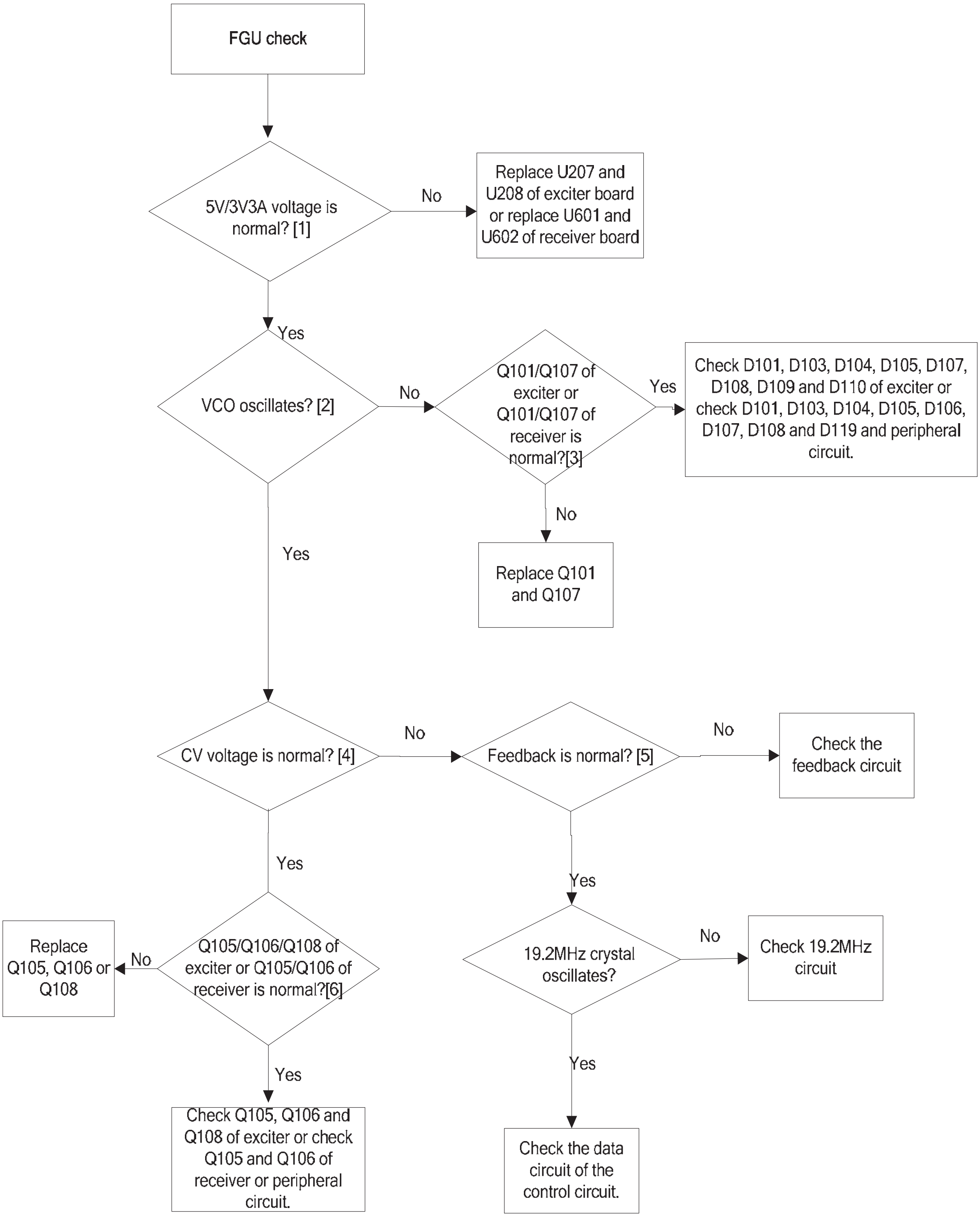
[6] Disconnect the front-end circuit and input 73.35MHz IF signal at pin 47 of U501; the sensitivity should be about-107dBm.

[7] Amplitude of 1st LO is 16-19dBm.

Transmitter Circuit



FGU Circuit


FGU check
5V/3V3A voltage is normal? [1]
No
Replace U207 and U208 of exciter board or replace U601 and U602 of receiver board
Yes
VCO oscillates? [2]
No
Q101/Q107 of exciter or Q101/Q107 of receiver is normal?[3]
Yes
Check D101, D103, D104, D105, D107, D108, D109 and D110 of exciter or check D101, D103, D104, D105, D106, D107, D108 and D119 and peripheral circuit.
No
Replace Q101 and Q107
Yes
CV voltage is normal? [4]
No
Feedback is normal? [5]
No
Check the feedback circuit
Yes
Yes
Replace Q105, Q106 or Q108
No
Q105/Q106/Q108 of exciter or Q105/Q106 of receiver is normal?[6]
19.2MHz crystal oscillates?
No
Check 19.2MHz circuit
Yes
Yes
Check Q105, Q106 and Q108 of exciter or check Q105 and Q106 of receiver or peripheral circuit.
Check the data circuit of the control circuit.

Description of Normal Situations:

[1] VCO: 5V; PLL: 3.3V;

[2] Frequency output for low VCO is 380～450MHz, and 420～490MHz for high VCO. The power output amplitude for both is -8～18dBm;

[3] CV voltage of Q101 and Q107: about 4V; the voltage difference between base voltage and emitter voltage is about 0.6V;

[4] Normal CV voltage is 0.6V-4.4V;

[5] Normal feedback amplitude is -8～-17dBm;

[6] CV voltage of Q105, Q106 and Q108: about 6V; the voltage difference between base voltage and emitter voltage is about 0.6V;

10. UHF2 (450-520MHz) Information

10.1 TX Circuit

The TX circuit consists of power amplifier (PA) circuit, power control circuit, diagnosis and detection circuit and protection circuit. It is to amplify the RF signal from exciter module to 50W, which then will be output via the antenna. The power control circuit is used for keeping the RF power of antenna at a fixed level. For the diagnosis and detection circuit, it detects the current TX power, antenna VSWR and transmitter temperature, and sends the detection result to the repeater’s control unit for monitoring the transmitter status. The role of protection circuit is to protect the power amplifier from being damaged due to high temperature or VSWR.

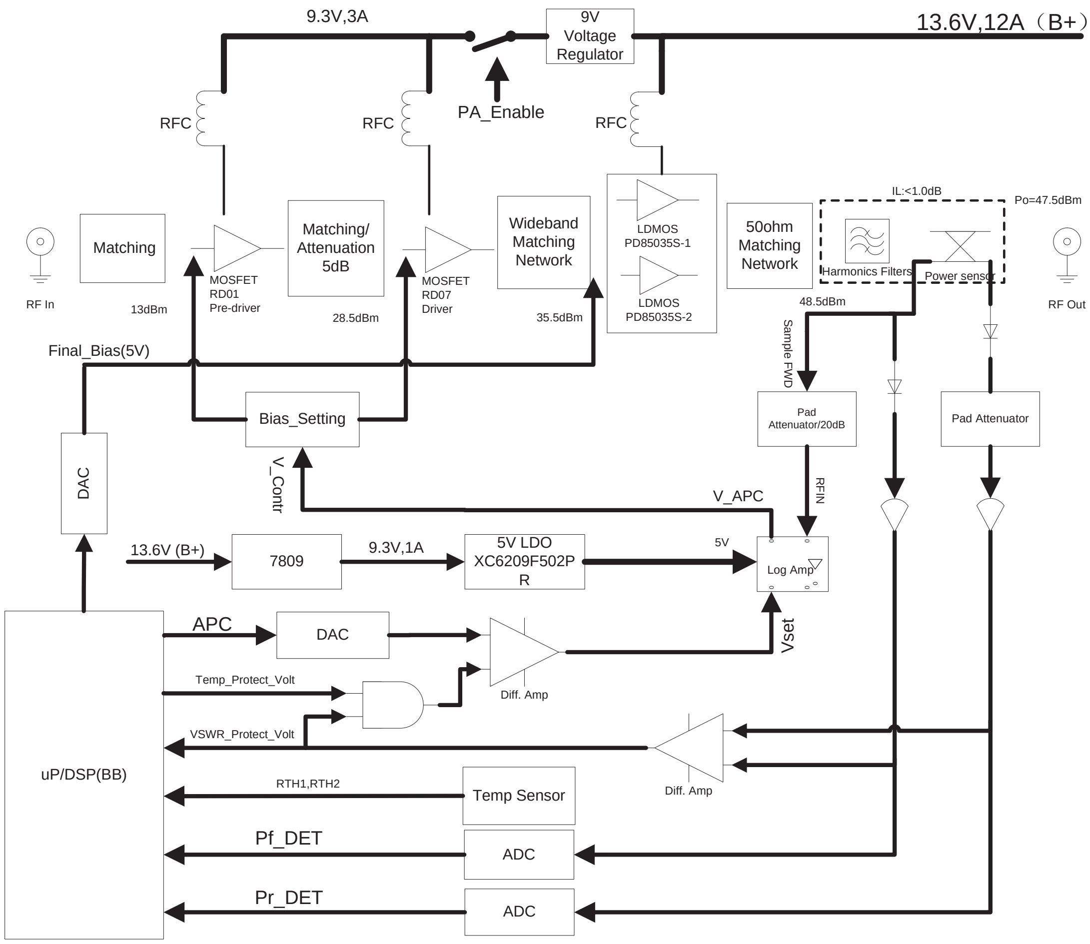


Figure 10-1 Block Diagram of PA Board

PA Module

PA module of transmitter consists of a 3-stage PA unit: pre-driver stage (Q401), driver stage (Q402) and final-stage (Q403 and Q404). Q401 and Q402 form the driver circuit, whose gain can be adjusted via the APC circuit, ensuring a constant RF power output of 50W.

Pre-driver Stage PA

This PA unit is a LDMOS power tube (Q401). It can amplify the 13dBm RF signals from exciter unit to 30dBm, which then will be sent to driver-stage PA via L-C network.

Driver Stage PA

This PA unit is a LDMOS power tube (Q402). It can further amplify the RF signals from Q401 to 38dBm, which is then sent to final-stage PA.

Final-stage PA

This PA unit consists of two LDMOS power tubes (Q403 and Q404). It can reduce the Q value of power input/output network and expand the bandwidth of PA circuit, ensuring PA circuit performance.

Harmonic Suppression filter

The harmonic filter of transmitter is a four-order LPF filter comprising C452, L410, C456, C542, L412, C460, C462, L413, C463, L414 and C466. It can decrease the harmonic component by increasing the out-of-band rejection capability.

Directional Coupler

The role of directional coupler is to detect forward and reverse power, so as to monitor and diagnose the operating status of transmitter. The forward power passes through a π-type attenuator, and then goes into the logarithmic amplifier, where it can automatically limit the output power of the transmitter to a relatively constant value (50W) according to the preset power level “Vset”. After going to the analog-to-digital converter (ADC) on the baseband board via the diode D402, the forward power is used to calculate the current TX power of the transmitter, which will be displayed in the diagnosis software in a real-time way. The directional coupler locates behind the LPF and is near the antenna output end. It is used to detect the reverse power. After going to the ADC on the baseboard via the diode D401, the reverse power is used to calculate the VSWR of antenna connector. An alarm will be generated when the VSWR is larger than the set threshold. Both forward and reverse detection voltages are calculated via a differential amplifier circuit (U407A). The output value is used to control the power level “Vset”. When the VSWR is too high, the TX power will be reduced to avoid damage to the PA.

Power Control

The transmitter power is controlled by power control circuit composed of logarithmic amplifier and directional coupler. After the transmitter power passes through the directional coupler, the detected RF signal goes to RF_IN of logarithmic amplifier via the Pi-type attenuator. Then the detected RF signal will adjust the output “Vapc” of logarithmic amplifier in a real time way based on the current power level “Vset”, so as to control the bias voltage at the gates of Q401 and Q402 and to ensure a constant output

power.

Temperature Protection

The thermistor RT402 is close to the heat sink pad of the final-stage amplifier, and is used to detect the current temperature of the heat sink. When the temperature of heat sink rises to the default value, the fan will run; when the temperature drops to a certain level, the fan will stop running.

When the temperature is above ℃, the control unit will send an alarm signal. If the temperature rises continuously, the temperature protection circuit (U407B) will output a control voltage, to reduce the power level Vset, thus reducing the transmitter power and protecting the PA. When the temperature falls below ℃, Vset and transmitter power will restore to their normal levels. Naturally, the alarm will dissolve.

Low-voltage and Over-voltage Protection

The control unit detects the voltage of system power supply in a real time way. When the voltage is below 12V, the control unit will reduce the TX power to 30W, ensuring no damage to the driver amplifier of transmitter. When the voltage is above 14.6V, it will reduce the power level to 40W, ensuring no damage to the final-stage amplifier of transmitter.

10.2 RX Circuit

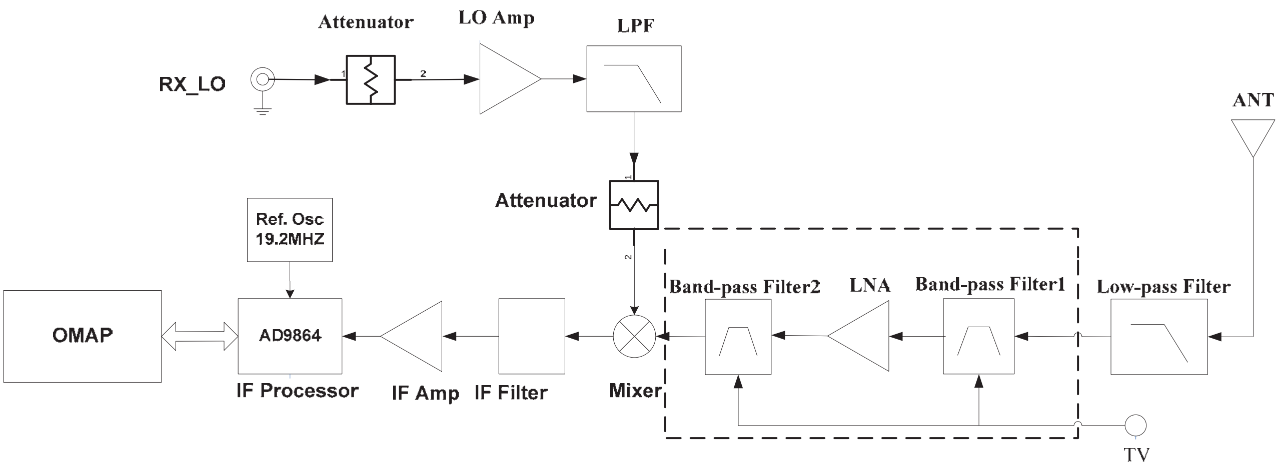


Figure 10-2 Block Diagram of Receiver Circuit

The receiver circuit mainly comprises the RF band-pass filter, low-noise amplifier, mixer, IF filter, IF amplifier and IF processor.

Front-end Circuit

The HF signal from the low-pass filter passes through the electrically tunable band-pass filter controlled via TV level, to remove out-of-band interference signal and to send wanted band-pass signal to the low-noise amplifier (U402). The amplified signal goes to a band-pass filter controlled via TV level, to

remove out-of-band interference signal generated during amplification, and to send wanted HF signal to the mixer.

The wanted signal passes through the RF band-pass filter and low-noise amplifier and goes to the mixer (U403). Meanwhile, the first local oscillator (LO) signal generated by VCO passes through the low-pass filter and also goes to the mixer. In the mixer, the wanted signal and the first LO signal are mixed to generate the first IF signal (73.35MHz). Then the signal passes through the LC to suppress carrier other than the first IF signal, and to increase the isolation between the mixer and the IF filter. After that, the first IF signal goes to crystal filter (Z401) for filtering, and is sent to the two-stage IF amplifier circuit for amplification. Then the amplified signal goes to the IF processor U501 for further processing.

Rear-end Circuit

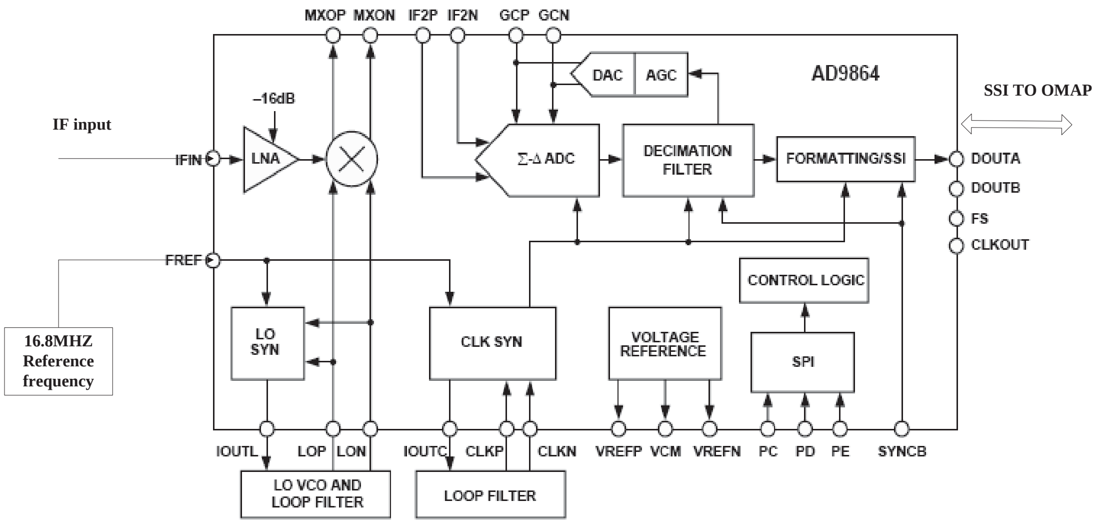


Figure 10-3 Diagram of IF Processor

The first IF signal (73.35MHz) output by the IF amplifier goes into U501 via Pin 47, where the signal is converted to the second IF signal (2.25MHz). Then the signal is converted to digital signal via ADC sampling, and output via the SSI interface. Finally, the digital signal is sent to DSP (OMAP5912) for demodulation.

U501 employs reference frequency of 19.2MHz and shares the crystal with OMAP. The second LO VCO comprises an oscillator, a varactor and some other components, to provide the 71.1/75.6MHz LO signal. The 18MHz clock frequency is generated by the LC resonance loop.

10.3 Frequency Generation Unit (FGU)

The repeater has two FGUs. One is RX FGU providing the first LO frequency for the RX system; the

other is TX FGU providing carrier and exciter signal for the TX system. They work simultaneously, but are locked at different frequencies.

Both RX FGU and TX FGU mainly consist of a reference crystal oscillator, a PLL, a VCO and a buffer amplifier. The PLL data is configured via OMAP. See the following figure:

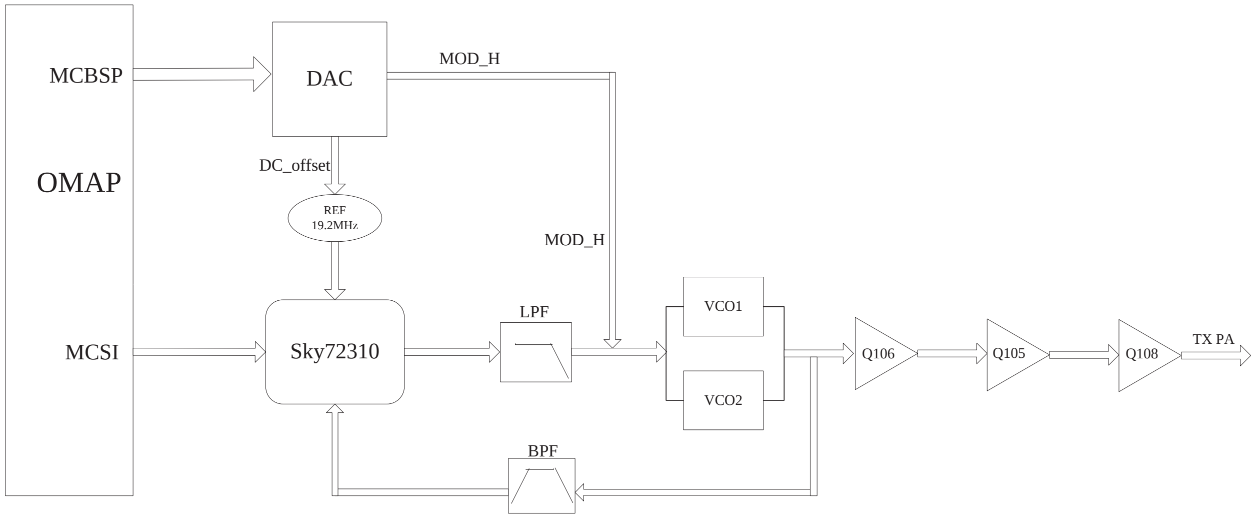


Figure 10-4 Block Diagram of Transmitter

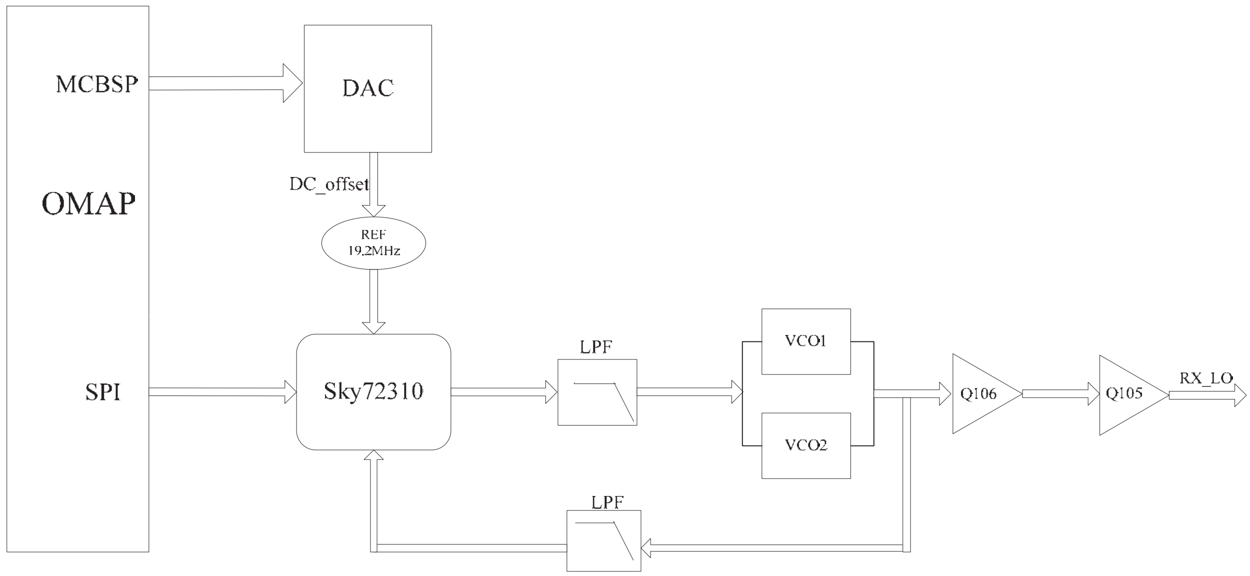


Figure 10-5 Block Diagram of Receiver

Reference Oscillator

The reference crystal oscillator is a temperature compensated crystal oscillator with a frequency of 19.2MHz. You can control the oscillator by adjusting the DC voltage output by the digital-to-analog converter, so as to ensure frequency accuracy.

PLL IC

The PLL is a fractional frequency divider (SKY72310), which consists of the pre-divider, programmable

divider, phase detector, charge pump and etc. The voltage of analog circuit and digital circuit of PLL IC is 3.3V voltage, while the voltage of charge pump is 5V. See the following figure:

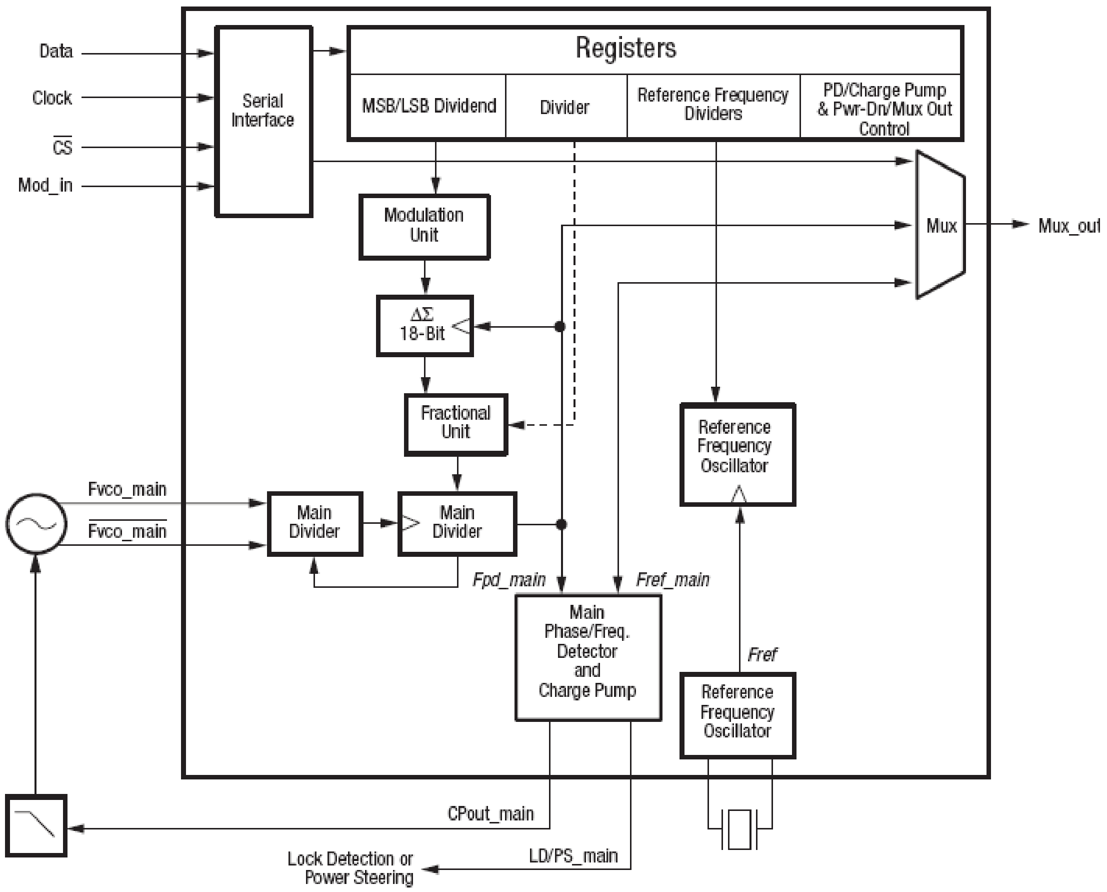


Figure 10-6 Block Diagram of PLL IC

SKY72310's role is to generate appropriate frequency based on the data transmitted by OMAP of baseband board. The 19.2MHz frequency generated by the reference crystal oscillator goes into the PLL, to generate the reference frequency. Meanwhile, the frequency generated by VCO goes into PLL for frequency division. The resulting frequency will be compared with reference frequency in terms of phase difference in the phase detector. After comparison, the resulting frequency is converted to CV voltage via the loop filter, to control the output frequency of VCO. In addition, as a key component of the modulation circuit, PLL can directly obtain data from the MCSI port of OMAP for modulation.

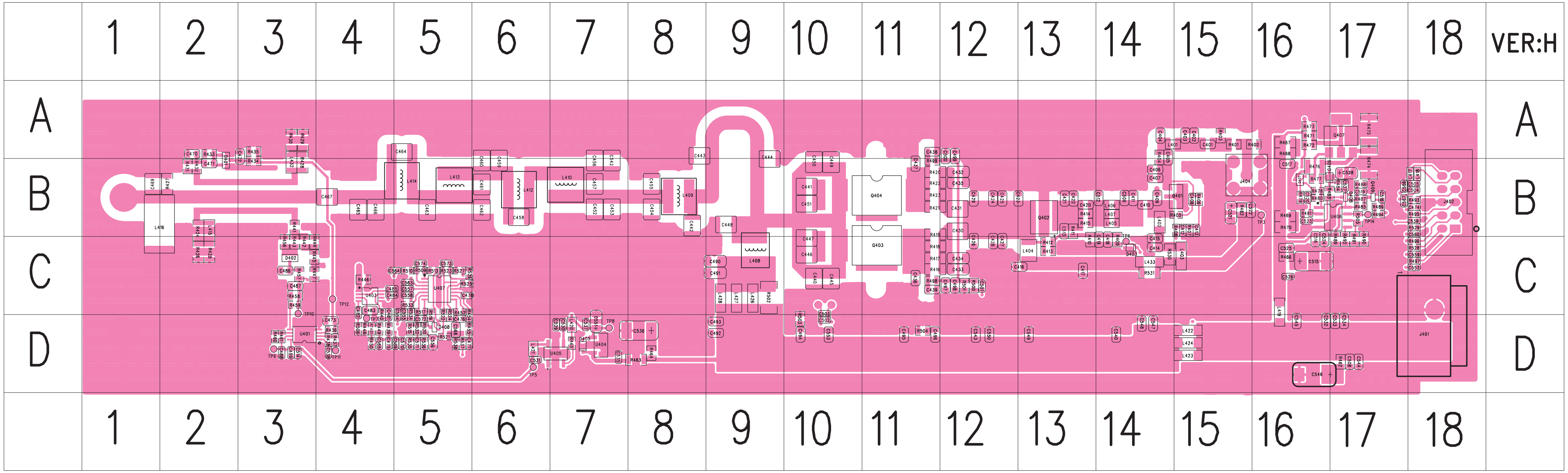
VCO

The VCO for RX unit comprises two transistors (Q101 and Q107), a varactor and four Colpitts oscillators. Q105 and Q106 are the buffer amplifiers for the RX unit.

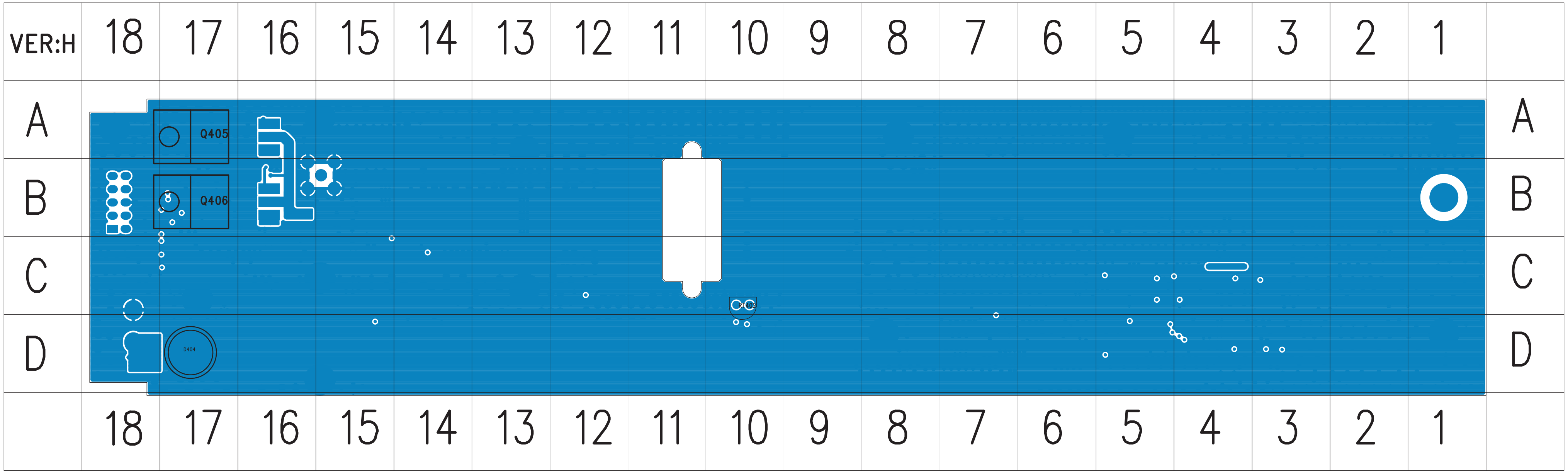
The VCO for exciter unit comprises two transistors (Q101 and Q107), a varactor and four Colpitts oscillators. Q105 and Q106 are the buffer amplifiers for the exciter unit.

10.4 PCB View

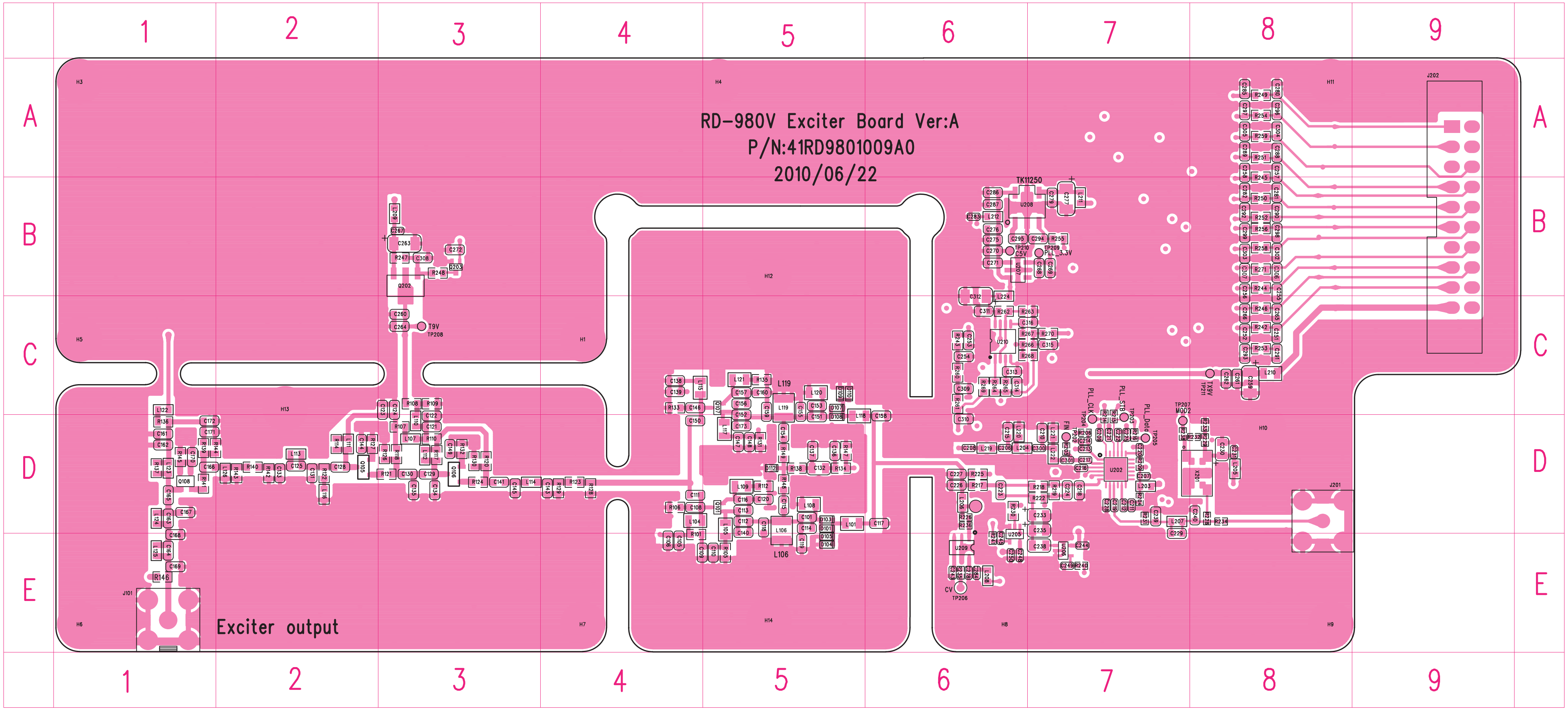
RD98X PCB View (PA Board)
Top Layer



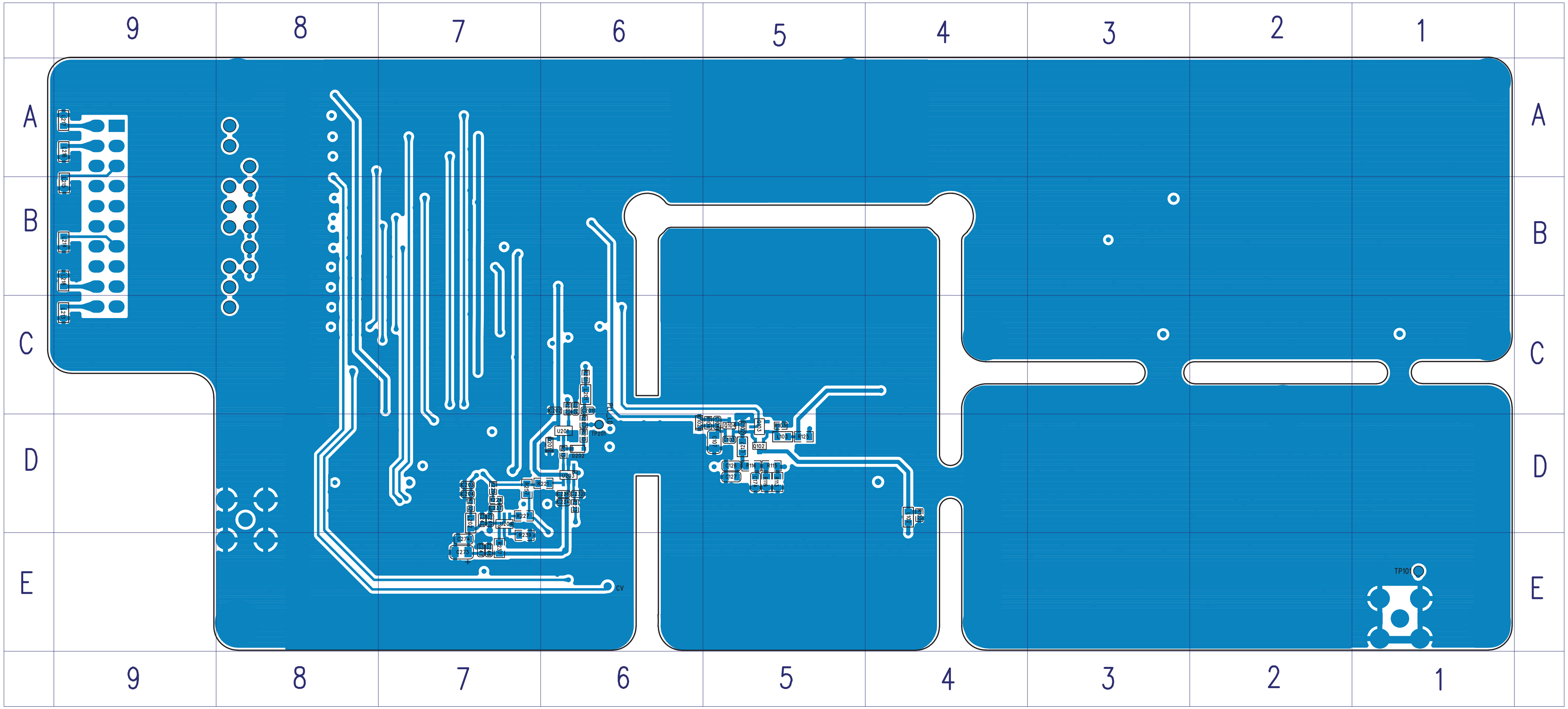
RD98X PCB View (PA Board)
Bottom Layer



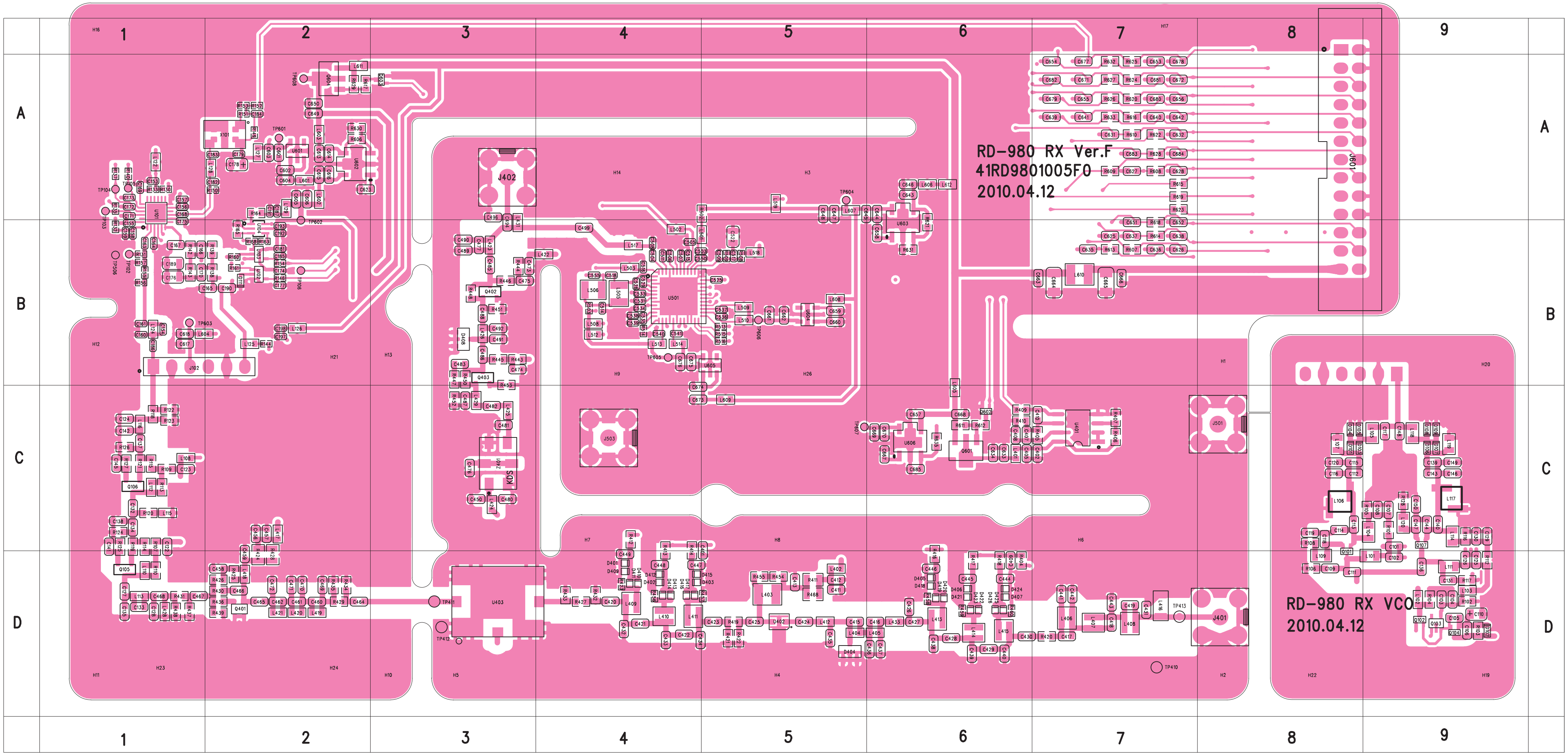
RD98X PCB View (Exciter Board)
Top Layer



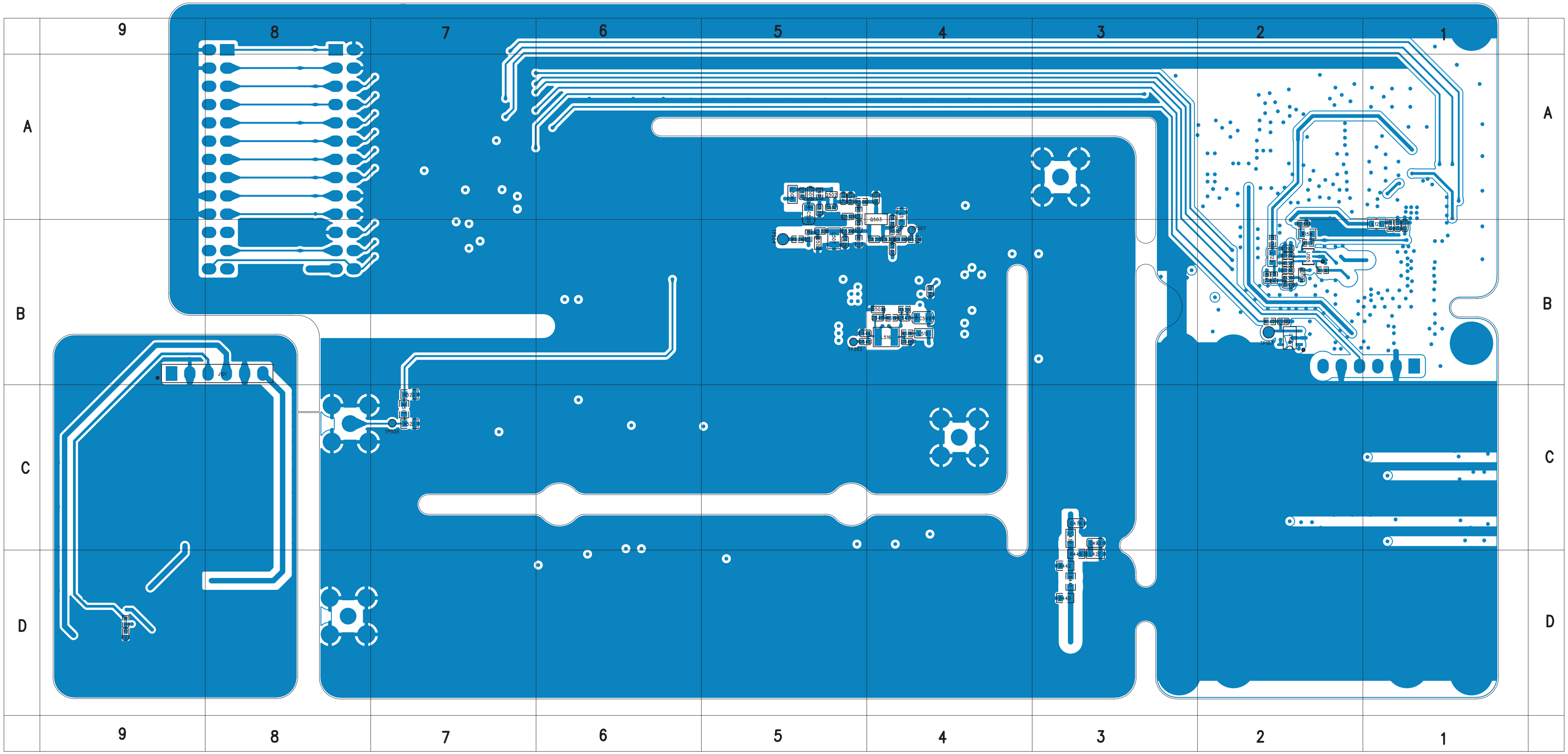
RD98X PCB View (Exciter Board)
Bottom Layer



RD98X PCB View (RX Board)
Top Layer

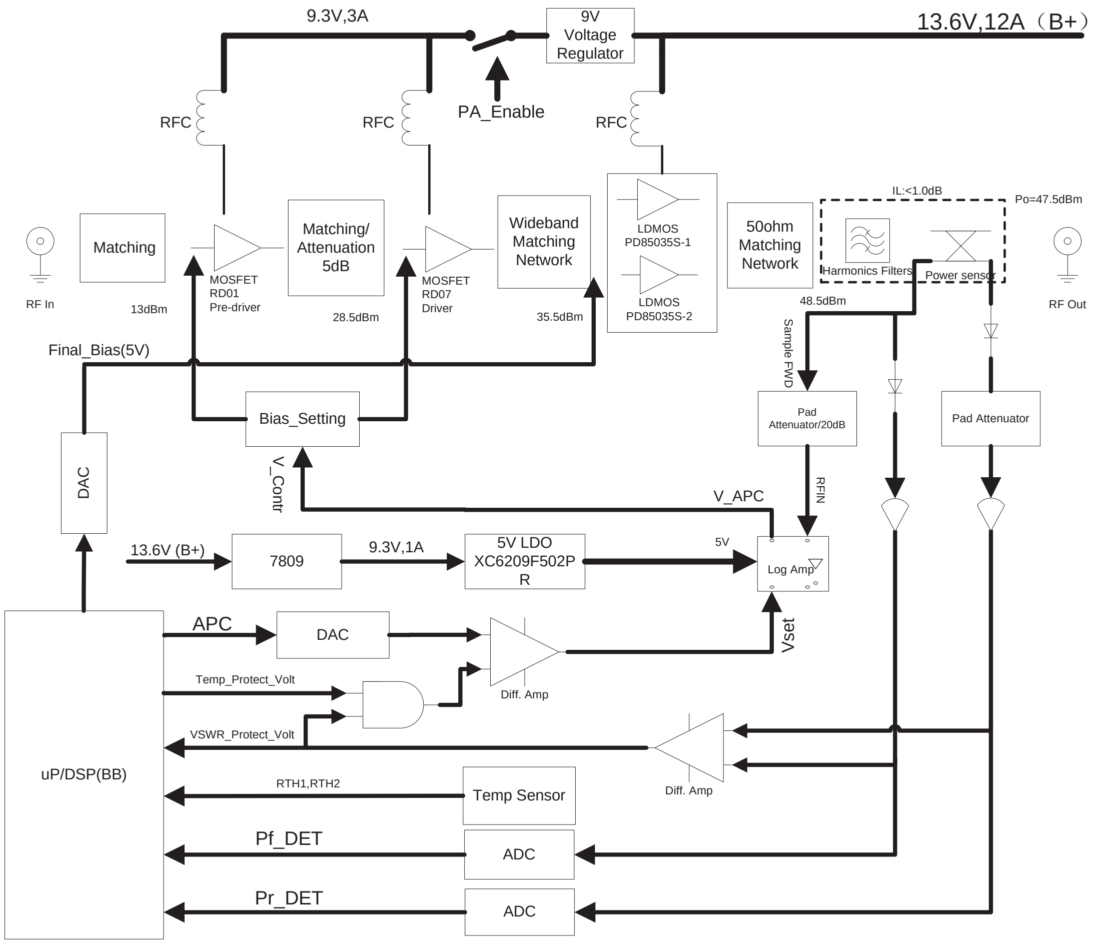


RD98X PCB View (RX Board)
Bottom Layer

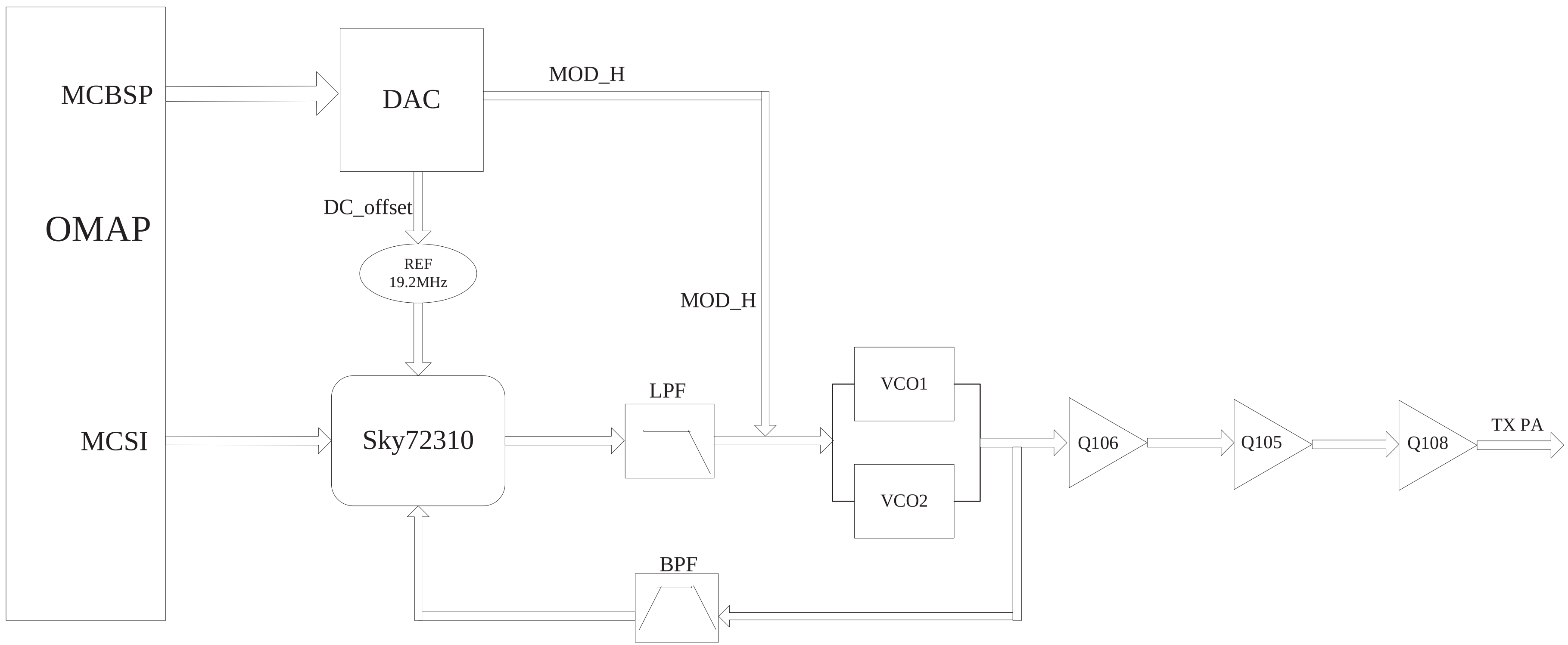


10.5 Block Diagram

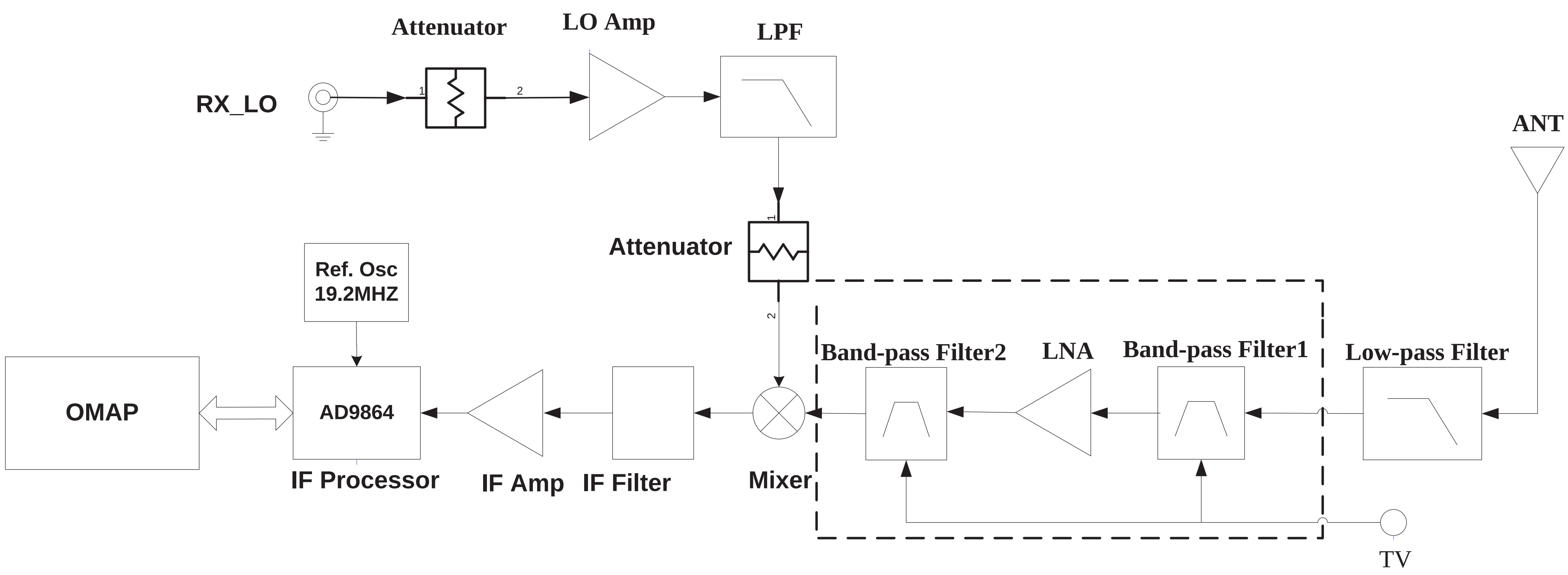
RD98X Block Diagram (PA Section)



RD98X Block Diagram (Exciter Section)

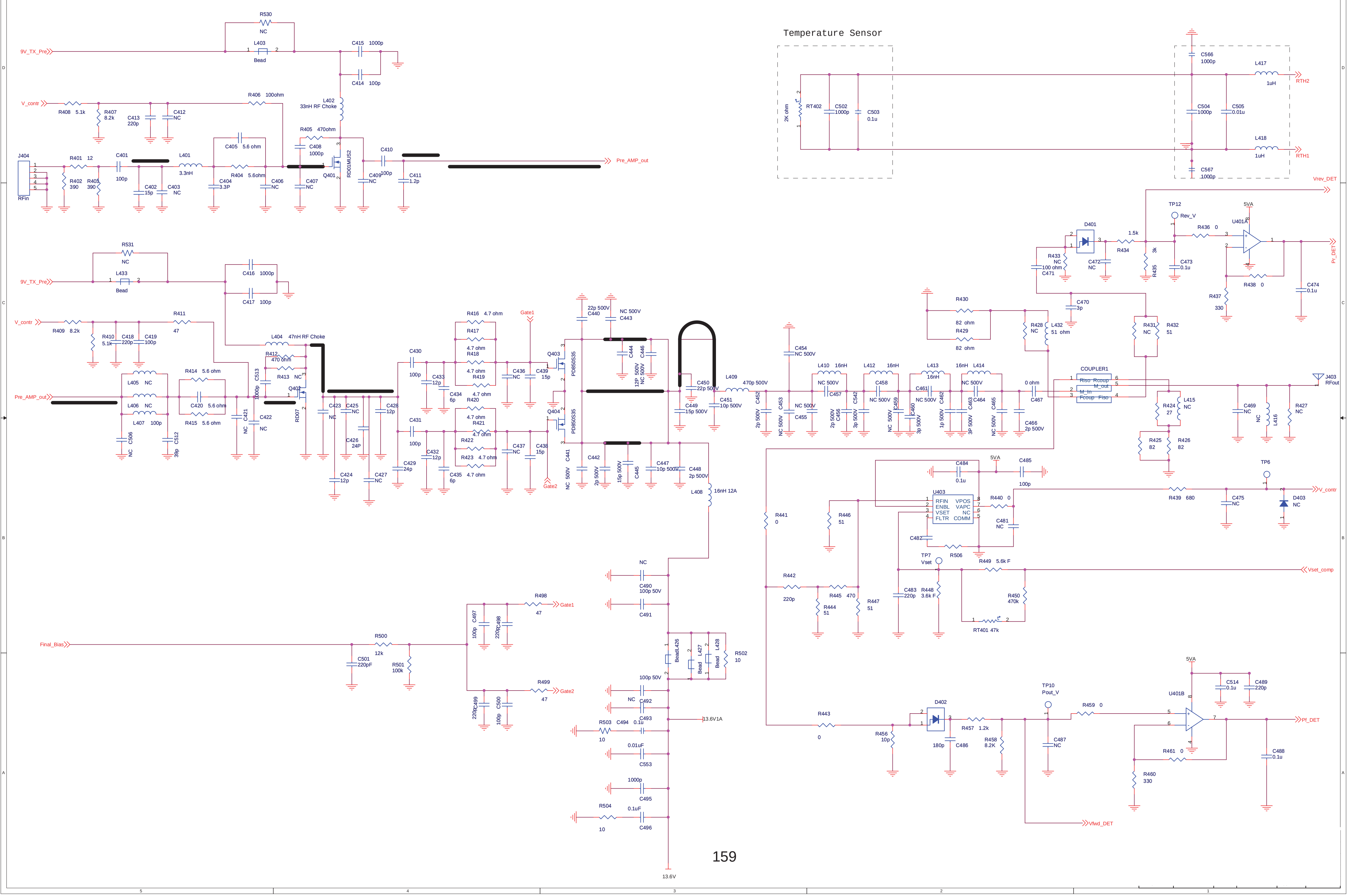


RD98X Block Diagram (RX Section)

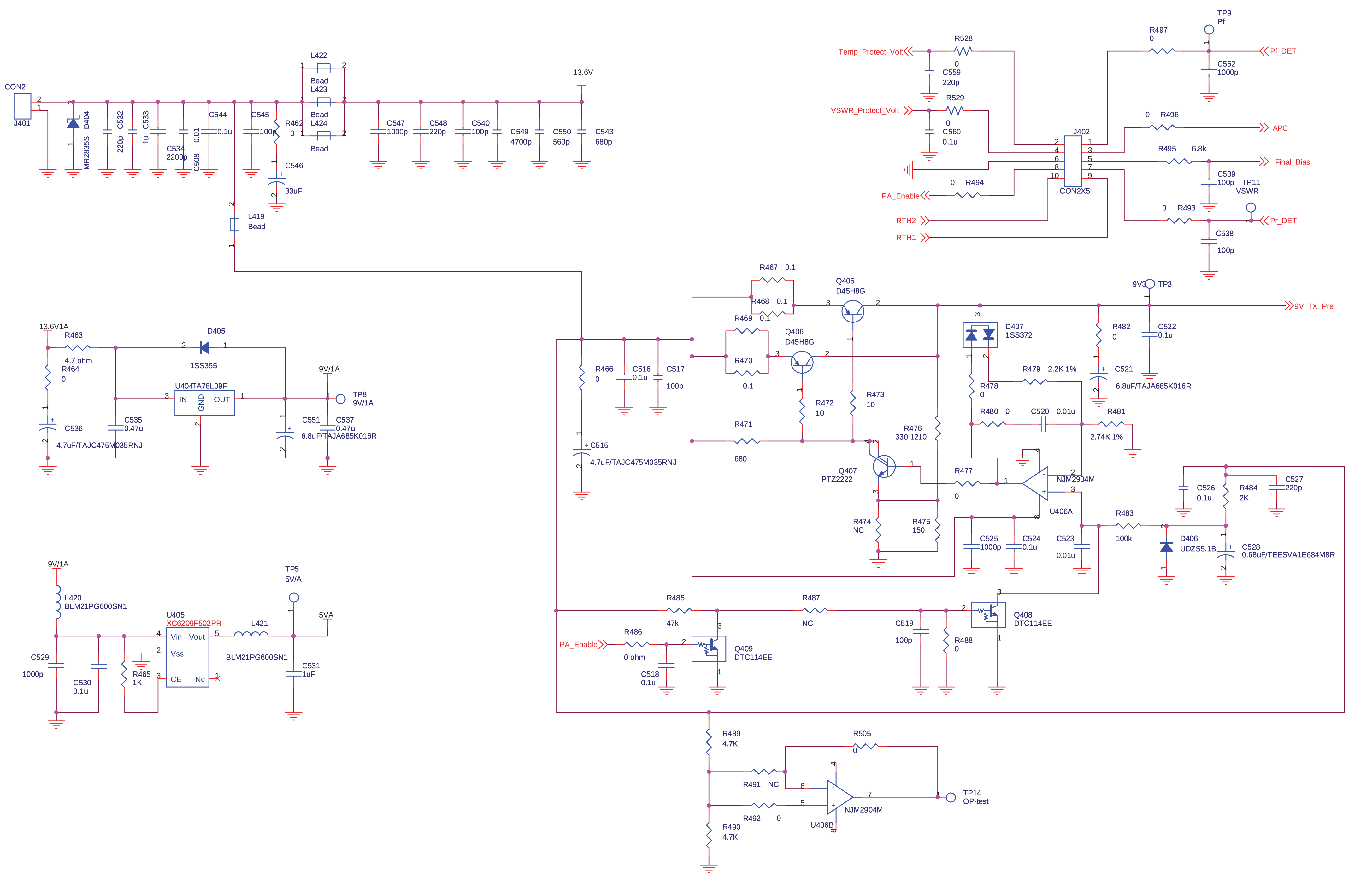


10.6 Schematic Diagram

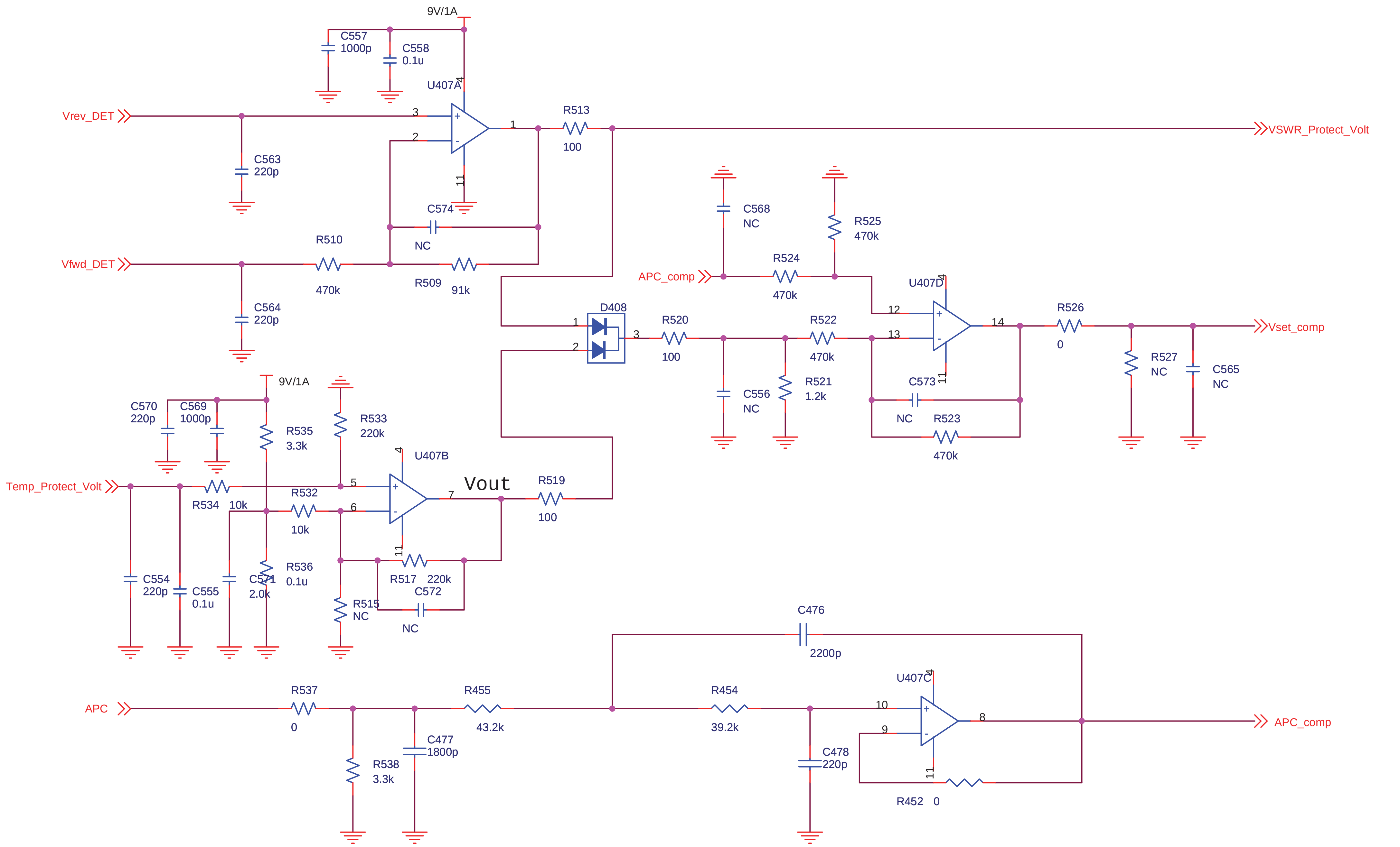
RD98X Schematic Diagram (PA Circuit)



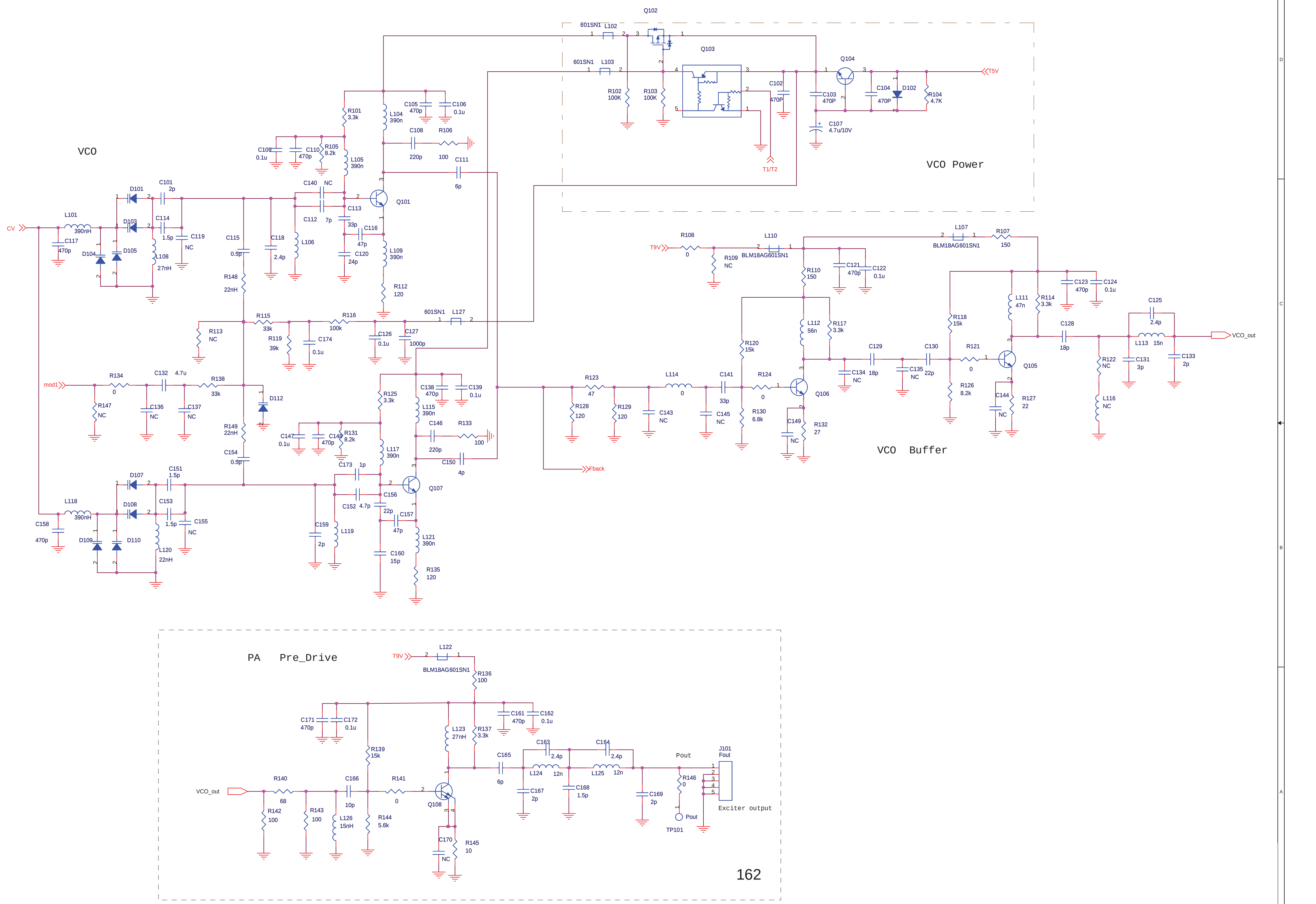
RD98X Schematic Diagram (TX_Power Supply Circuit)



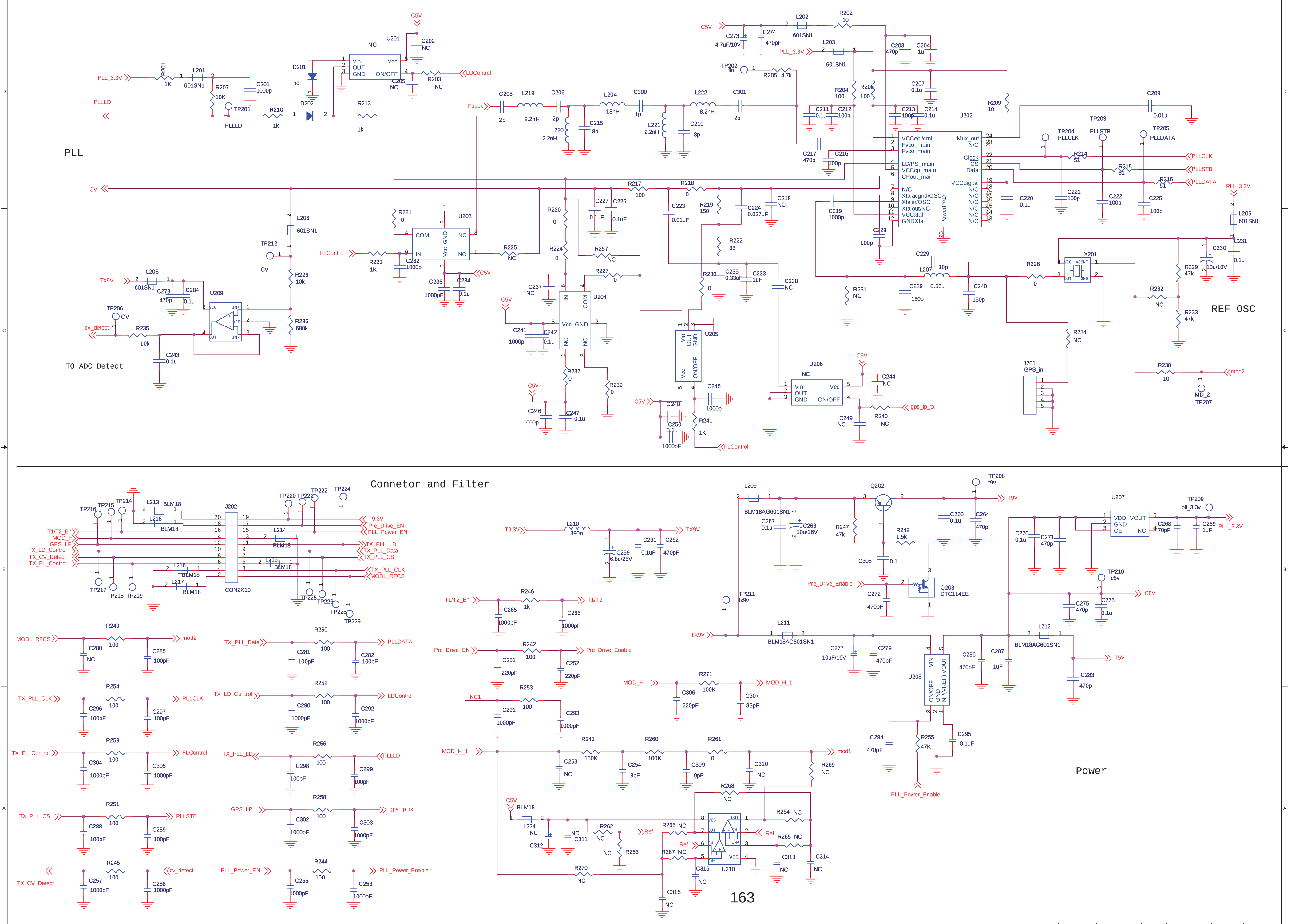
RD98X Schematic Diagram (TX_VSWR & Temperature Protection Circuit)



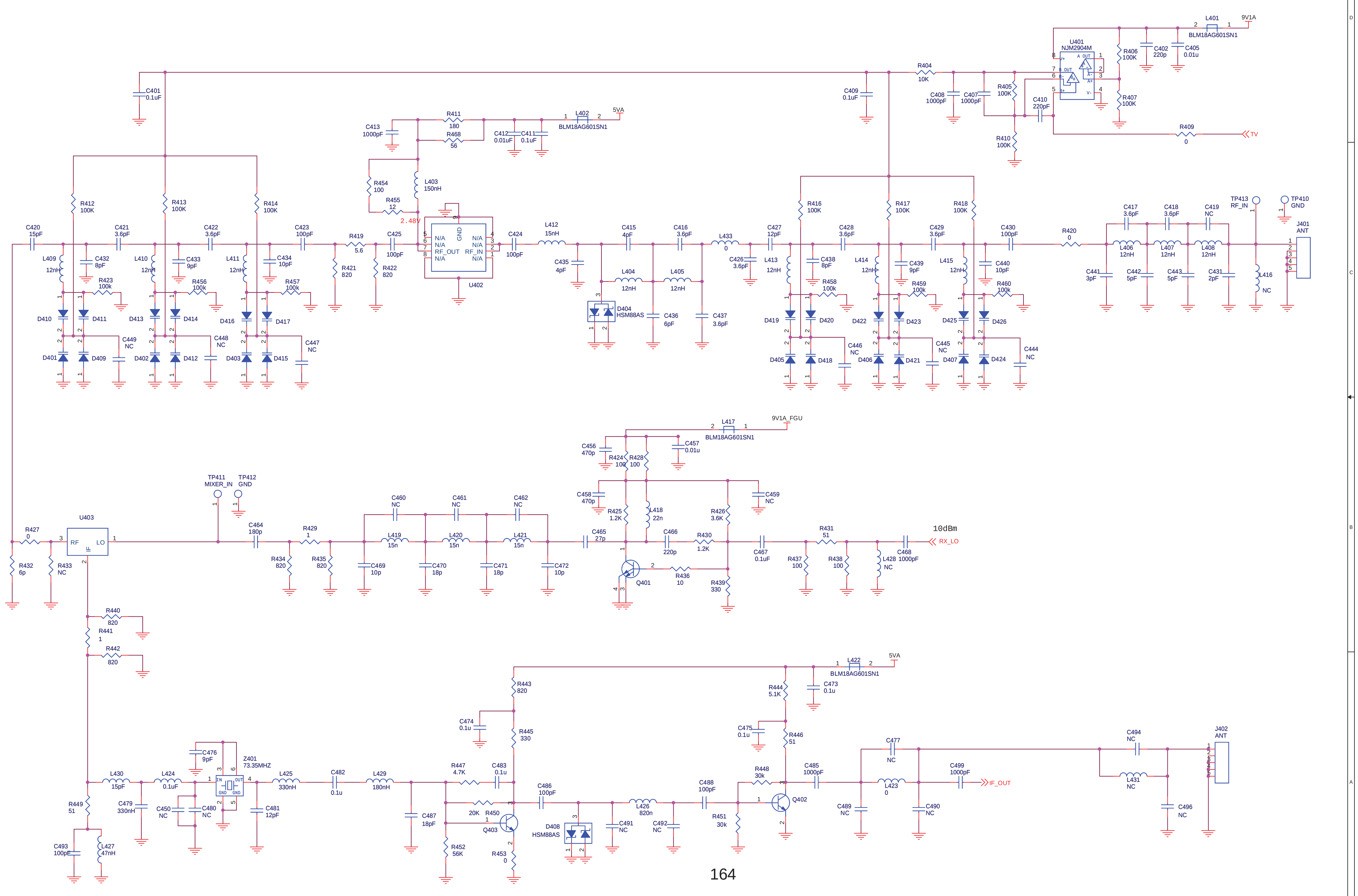
RD98X Schematic Diagram (Exciter_VCO/Buffer/Pre_Driver Circuit)



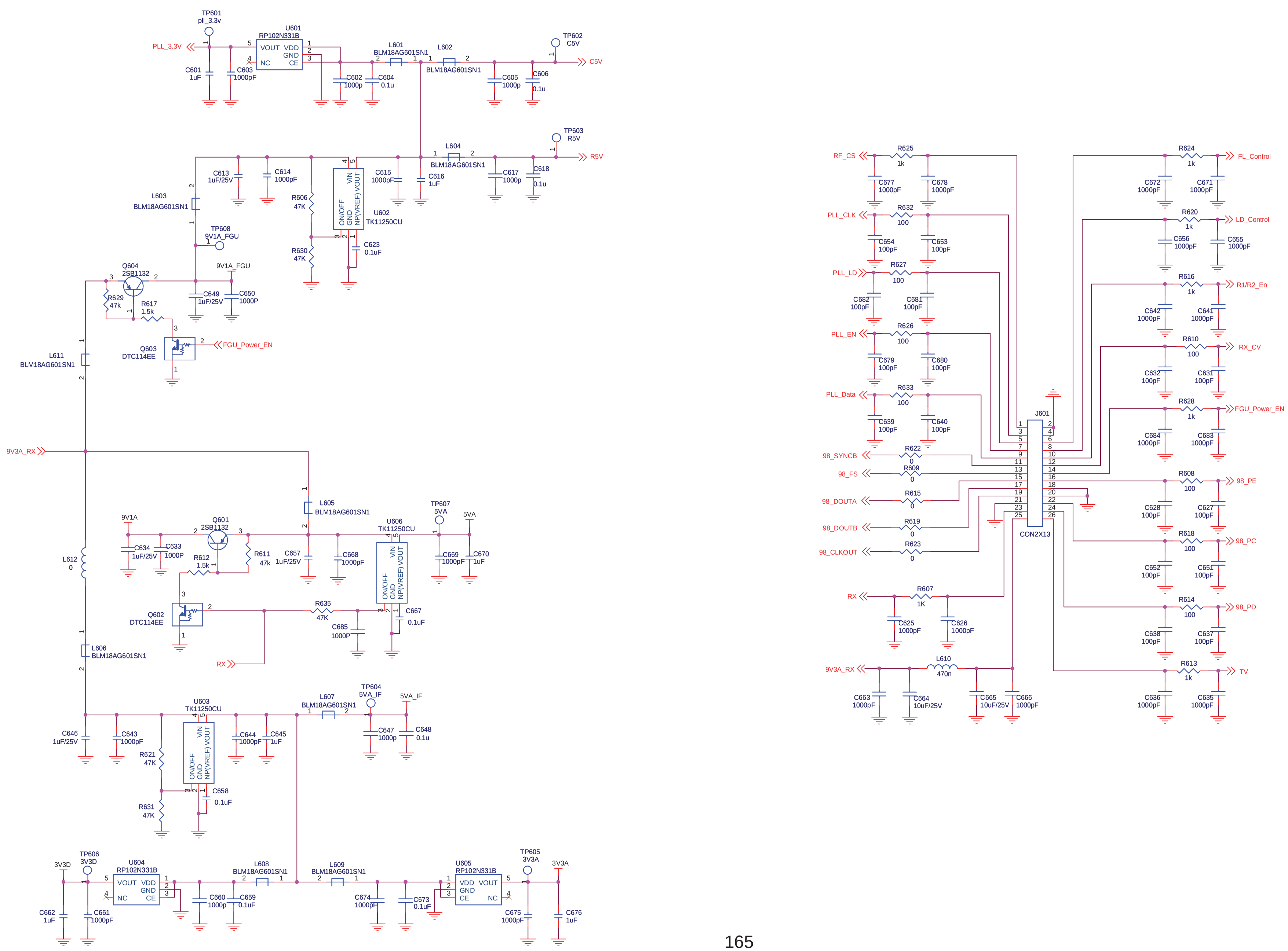
RD98X Schematic Diagram (Exciter_PLL/Power Supply/Connector Circuit)



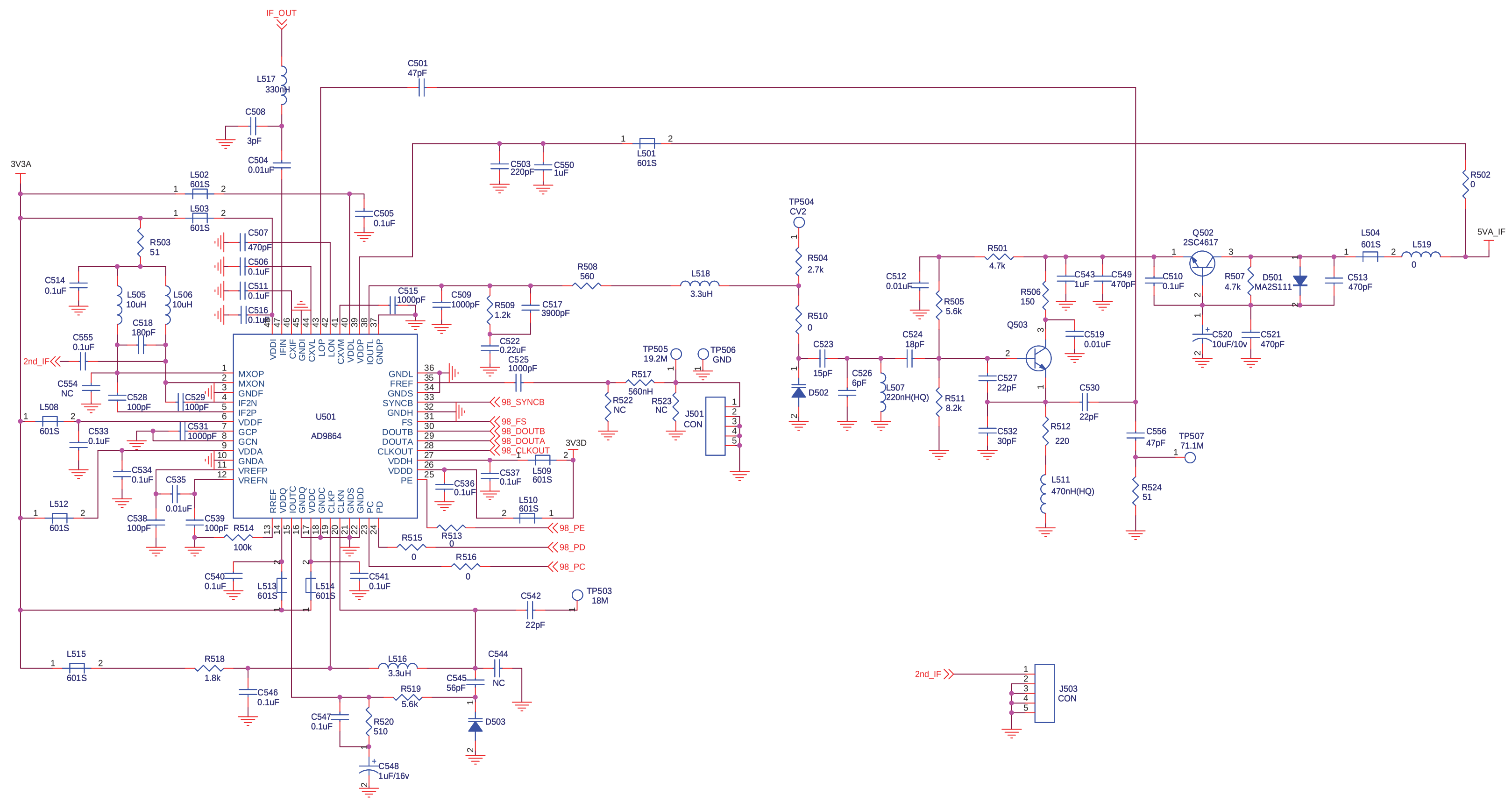
RD98X Schematic Diagram (RX_Front-end Circuit)



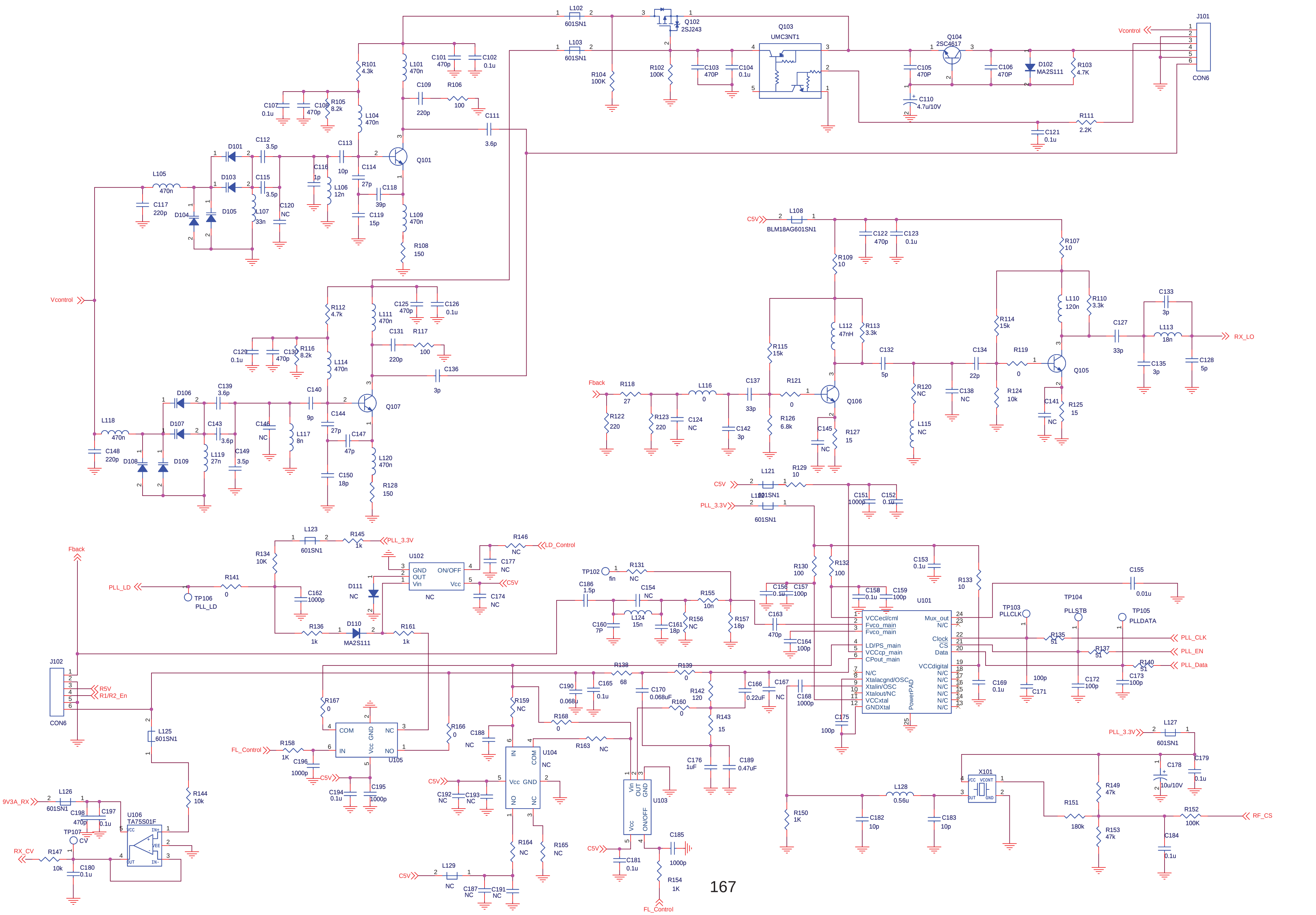
RD98X Schematic Diagram (RX_Power Supply Circuit)



RD98X Schematic Diagram (RX_AD9864 Circuit)



RD98X Schematic Diagram (RX_Frequency Synthesizer Circuit)



10.7 Parts List

Power Amplifier

No.	Ref. No.	Part No.	Description
1	C401	3101071010000	100PF
2	C410	3101071010000	100PF
3	C414	3101071010000	100PF
4	C417	3101071010000	100PF
5	C419	3101071010000	100PF
6	C492	3101071010000	100PF
7	C497	3101071010000	100PF
8	C500	3101071010000	100PF
9	C517	3101071010000	100PF
10	C540	3101071010000	100PF
11	C545	3101071010000	100PF
12	L407	3101071010000	100PF
13	C413	3101062210000	220PF
14	C478	3101062210000	220PF
15	C489	3101062210000	220PF
16	C501	3101062210000	220PF
17	C527	3101062210000	220PF
18	C554	3101062210000	220PF
19	C559	3101062210000	220PF
20	C563	3101062210000	220PF
21	C564	3101062210000	220PF
22	C570	3101062210000	220PF
23	C418	3101072210010	220PF
24	C483	3101072210010	220PF
25	C498	3101072210010	220PF
26	C499	3101072210010	220PF
27	C532	3101072210010	220PF
28	C548	3101072210010	220PF
29	R442	3101072210010	220PF
30	C415	3101071020010	1000PF
31	C416	3101071020010	1000PF
32	C495	3101071020010	1000PF
33	C513	3101071020010	1000PF
34	C525	3101071020010	1000PF
35	C547	3101071020010	1000PF
36	C402	3101071500000	15PF
37	C438	3101071500000	15PF
38	C439	3101071500000	15PF

No.	Ref. No.	Part No.	Description
39	C430	3101371010000	100PF
40	C431	3101371010000	100PF
41	C432	3101081200010	12PF
42	C433	3101081200010	12PF
43	C434	3101080600010	6PF
44	C435	3101080600010	6PF
45	C440	3101372200000	22PF
46	C450	3101372200000	22PF
47	C444	3101371200000	12PF
48	C448	3101371200000	12PF
49	C442	3101370200000	2PF
50	C452	3101370200000	2PF
51	C456	3101370200000	2PF
52	C466	3101370200000	2PF
53	C462	3101370100000	1PF
54	C460	3101370300000	3PF
55	C463	3101370300000	3PF
56	C542	3101370300000	3PF
57	L409	3101374710000	470PF
58	C473	3101071040000	0.1UF
59	C494	3101071040000	0.1UF
60	C496	3101071040000	0.1UF
61	C516	3101071040000	0.1UF
62	C522	3101071040000	0.1UF
63	C524	3101071040000	0.1UF
64	C544	3101071040000	0.1UF
65	C474	3101061040010	0.1UF
66	C484	3101061040010	0.1UF
67	C488	3101061040010	0.1UF
68	C503	3101061040010	0.1UF
69	C514	3101061040010	0.1UF
70	C518	3101061040010	0.1UF
71	C526	3101061040010	0.1UF
72	C530	3101061040010	0.1UF
73	C555	3101061040010	0.1UF
74	C558	3101061040010	0.1UF
75	C560	3101061040010	0.1UF
76	R536	3101061040010	0.1UF
77	C485	3101061010010	100PF
78	C519	3101061010010	100PF
79	C538	3101061010010	100PF
80	C539	3101061010010	100PF

No.	Ref. No.	Part No.	Description
81	C476	3101062220010	2200PF
82	C408	3101061020000	1000PF
83	C502	3101061020000	1000PF
84	C504	3101061020000	1000PF
85	C529	3101061020000	1000PF
86	C552	3101061020000	1000PF
87	C557	3101061020000	1000PF
88	C566	3101061020000	1000PF
89	C567	3101061020000	1000PF
90	C569	3101061020000	1000PF
91	C491	3101084710010	470PF
92	C505	3101061030010	0.01UF
93	C520	3101061030010	0.01UF
94	C523	3101061030010	0.01UF
95	C508	3101071030010	0.01UF
96	C553	3101071030010	0.01UF
97	C512	3101073900020	39PF
98	C515	3104994750020	4.7UF
99	C536	3104994750020	4.7UF
100	C521	3104086850030	6.8UF
101	C551	3104086850030	6.8UF
102	C528	3104086840020	0.68UF
103	C531	3101061050000	1UF
104	C533	3101071050160	1UF
105	C534	3101072220010	2200PF
106	C535	3101064740000	0.47UF
107	C537	3101064740000	0.47UF
108	C546	3104993360000	33UF
109	D401	3609030000000	DIODE
110	D402	3609030000000	DIODE
111	D405	3303010500040	DIODE
112	D406	3302030500030	DIODE
113	D407	3303010500290	DIODE
114	D408	3303030100010	DIODE
115	L401	3212107339000	3.3NH
116	L403	3221513600000	Ferrite bead
117	L419	3221513600000	Ferrite bead
118	L422	3221513600000	Ferrite bead
119	L423	3221513600000	Ferrite bead
120	L424	3221513600000	Ferrite bead
121	L426	3221513600000	Ferrite bead
122	L427	3221513600000	Ferrite bead

No.	Ref. No.	Part No.	Description
123	L428	3221513600000	Ferrite bead
124	L433	3221513600000	Ferrite bead
125	L404	3231351680000	Ferrite bead
126	L408	3231803050000	Ferrite bead
127	L410	3233099160000	Ferrite bead
128	L412	3233099160000	Ferrite bead
129	L413	3233099160000	Ferrite bead
130	L414	3233099160000	Ferrite bead
131	L417	3213306102000	1UH
132	L418	3213306102000	1UH
133	L420	3221507600000	Transistor
134	Q401	3504990000010	PA IC
135	Q402	3504990000040	PA IC
136	Q408	3403008000010	Transistor
137	Q409	3403008000010	Transistor
138	R455	3001064730000	47KΩ
139	R485	3001064730000	47KΩ
140	RT401	3001064730000	47KΩ
141	R401	3001071200000	12Ω
142	R402	3001073910000	390Ω
143	R403	3001073910000	390Ω
144	R406	3001061010000	100Ω
145	R513	3001061010000	100Ω
146	R519	3001061010000	100Ω
147	R506	3001061030000	10KΩ
148	R532	3001061030000	10KΩ
149	R534	3001061030000	10KΩ
150	R457	3001071220000	1.2KΩ
151	R416	3001084790000	4.7Ω
152	R417	3001084790000	4.7Ω
153	R418	3001084790000	4.7Ω
154	R419	3001084790000	4.7Ω
155	R420	3001084790000	4.7Ω
156	R421	3001084790000	4.7Ω
157	R422	3001084790000	4.7Ω
158	R423	3001084790000	4.7Ω
159	R463	3001084790000	4.7Ω
160	R424	3001082700000	27Ω
161	R425	3001088200010	82Ω
162	R426	3001088200010	82Ω
163	R429	3001088200010	82Ω
164	R430	3001088200010	82Ω

No.	Ref. No.	Part No.	Description
165	R432	3001075100000	51Ω
166	R444	3001075100000	51Ω
167	R446	3001075100000	51Ω
168	R447	3001075100000	51Ω
169	R443	3001071000000	10Ω
170	R472	3001071000000	10Ω
171	R473	3001071000000	10Ω
172	R503	3001071000000	10Ω
173	R504	3001071000000	10Ω
174	R436	3001060000000	0Ω
175	R438	3001060000000	0Ω
176	R440	3001060000000	0Ω
177	R452	3001060000000	0Ω
178	R459	3001060000000	0Ω
179	R461	3001060000000	0Ω
180	R478	3001060000000	0Ω
181	R480	3001060000000	0Ω
182	R486	3001060000000	0Ω
183	R487	3001060000000	0Ω
184	R496	3001060000000	0Ω
185	R526	3001060000000	0Ω
186	R537	3001060000000	0Ω
187	R441	3001070000000	0Ω
188	R462	3001070000000	0Ω
189	R464	3001070000000	0Ω
190	R466	3001070000000	0Ω
191	R477	3001070000000	0Ω
192	R482	3001070000000	0Ω
193	R492	3001070000000	0Ω
194	R505	3001070000000	0Ω
195	R493	3210306560000	56NH
196	R494	3210306560000	56NH
197	R497	3210306560000	56NH
198	R528	3210306560000	56NH
199	R529	3210306560000	56NH
200	R448	3001063620000	3.6KΩ
201	R450	3001064740000	470KΩ
202	R510	3001064740000	470KΩ
203	R522	3001064740000	470KΩ
204	R523	3001064740000	470KΩ
205	R524	3001064740000	470KΩ
206	R525	3001064740000	470KΩ

No.	Ref. No.	Part No.	Description
207	R454	3001063930000	39KΩ
208	R465	3001061020000	1KΩ
209	R467	3001080190000	0.1Ω
210	R468	3001080190000	0.1Ω
211	R469	3001080190000	0.1Ω
212	R470	3001080190000	0.1Ω
213	R471	3001076810000	680Ω
214	R475	3001161510010	150Ω
215	R479	3001062220000	2.2KΩ
216	R481	3001062720030	2.7KΩ
217	R483	3001071040010	100KΩ
218	R501	3001071040010	100KΩ
219	C571	3001062020030	2KΩ
220	R484	3001062020030	2KΩ
221	R489	3001074720010	4.7KΩ
222	R490	3001074720010	4.7KΩ
223	R502	3001161000010	10Ω
224	U401	3605008005070	PA IC
225	U403	3623025000000	Wave detector
226	U404	3608002005490	Zener diode
227	U405	3608015000060	Zener diode
228	U406	3605008001690	Operational amplifier
229	U407	3605010000020	Operational amplifier
230	R521	3001061220000	1.2KΩ
231	R449	3001065620000	5.6KΩ
232	R476	3001083310010	330Ω
233	C424	3101071200000	12PF
234	C428	3101071200000	12PF
235	R535	3001063320000	3.3KΩ
236	R538	3001063320000	3.3KΩ
237	R517	3001062240000	220KΩ
238	R533	3001062240000	220KΩ
239	R437	3001063310000	330Ω
240	R460	3001063310000	330Ω
241	L402	3231351660000	Ferrite bead
242	R439	3001066810010	680Ω
243	C482	3101063920000	3900PF
244	R495	3001066820000	6.8KΩ
245	R411	3001074700000	47Ω
246	R498	3001074700000	47Ω
247	R499	3001074700000	47Ω
248	C477	3101061820000	1800PF

No.	Ref. No.	Part No.	Description
249			PCB
250	C467	3001080000000	0Ω
251	D404	3302060000000	Diode
252	R500	3001071230010	12KΩ
253	R412	3001074710000	470Ω
254	R445	3001074710000	470Ω
255	R456	3101071000020	10PF
256	C472	3101071810000	180PF
257	C486	3101071810000	180PF
258	C411	3101071290000	1.2P
259	C549	3101074720030	4700PF
260	C550	3101075610010	560P
261	C543	3101076810000	680P
262	R434	3001071520000	1.5KΩ
263	R409	3001078220010	8.2KΩ
264	R458	3001078220010	8.2KΩ
265	Q407	3404999000020	NPN transistor
266	R410	3001075120000	5.1KΩ
267	R408	3001065120000	5.1KΩ
268	R407	3001068220000	8.2KΩ
269	R405	3001064710000	470Ω
270	C404	3101073390000	3.3P
271	C426	3101072400000	24PF
272	C429	3101072400000	24PF
273	C445	3101371500000	15PF
274	C449	3101371500000	15PF
275	R520	3001061010040	100Ω
276	R509	3001069130000	91KΩ
277	C471	3001071010000	100Ω
278	R435	3001073020000	3KΩ
279	C405	3001075690000	5.6Ω
280	C420	3001075690000	5.6Ω
281	R404	3001075690000	5.6Ω
282	R414	3001075690000	5.6Ω
283	R415	3001075690000	5.6Ω
284	L432	3001085100000	51Ω
285	C470	3101060300010	3PF
286	C447	3101371000000	10pF
287	C451	3101371000000	10pF

Exciter Board

No.	Ref. No.	Part No.	Description
1	R220	3001050000000	0Ω
2	R224	3001050000000	0Ω
3	R228	3001050000000	0Ω
4	L114	3001060000000	0Ω
5	R108	3001060000000	0Ω
6	R121	3001060000000	0Ω
7	R124	3001060000000	0Ω
8	R134	3001060000000	0Ω
9	R141	3001060000000	0Ω
10	R146	3001060000000	0Ω
11	R218	3001060000000	0Ω
12	R221	3001060000000	0Ω
13	R227	3001060000000	0Ω
14	R230	3001060000000	0Ω
15	R237	3001060000000	0Ω
16	R239	3001060000000	0Ω
17	R261	3001060000000	0Ω
18	R202	3001051000000	10Ω
19	R209	3001051000000	10Ω
20	R238	3001051000000	10Ω
21	R145	3001061000000	10Ω
22	R127	3001062200000	22Ω
23	R132	3001062700000	27Ω
24	R222	3001063300000	33Ω
25	R123	3001064700000	47Ω
26	R214	3001055100020	51Ω
27	R215	3001055100020	51Ω
28	R216	3001055100020	51Ω
29	R140	3001066800000	68Ω
30	R204	3001051010000	100Ω
31	R206	3001051010000	100Ω
32	R106	3001061010000	100Ω
33	R133	3001061010000	100Ω
34	R136	3001061010000	100Ω
35	R142	3001061010000	100Ω
36	R143	3001061010000	100Ω
37	R217	3001061010000	100Ω
38	R242	3001061010000	100Ω
39	R244	3001061010000	100Ω
40	R245	3001061010000	100Ω

No.	Ref. No.	Part No.	Description
41	R249	3001061010000	100Ω
42	R250	3001061010000	100Ω
43	R251	3001061010000	100Ω
44	R252	3001061010000	100Ω
45	R253	3001061010000	100Ω
46	R254	3001061010000	100Ω
47	R256	3001061010000	100Ω
48	R258	3001061010000	100Ω
49	R259	3001061010000	100Ω
50	R112	3001061210000	120Ω
51	R128	3001061210000	120Ω
52	R129	3001061210000	120Ω
53	R135	3001061210000	120Ω
54	R107	3001061510000	150Ω
55	R110	3001061510000	150Ω
56	R219	3001061510000	150Ω
57	R201	3001051020000	1KΩ
58	R210	3001051020000	1KΩ
59	R213	3001051020000	1KΩ
60	R223	3001051020000	1KΩ
61	R241	3001051020000	1KΩ
62	R246	3001061020010	1KΩ
63	R248	3001061520000	1.5KΩ
64	R101	3001063320000	3.3KΩ
65	R114	3001063320000	3.3KΩ
66	R117	3001063320000	3.3KΩ
67	R125	3001063320000	3.3KΩ
68	R137	3001063320000	3.3KΩ
69	R104	3001054720000	4.7KΩ
70	R205	3001054720000	4.7KΩ
71	R144	3001065620000	5.6KΩ
72	R130	3001066820000	6.8KΩ
73	R105	3001068220000	8.2KΩ
74	R126	3001068220000	8.2KΩ
75	R131	3001068220000	8.2KΩ
76	R207	3001051030000	10KΩ
77	R226	3001051030000	10KΩ
78	R235	3001051030000	10KΩ
79	R118	3001061530010	15KΩ
80	R120	3001061530010	15KΩ
81	R139	3001061530010	15KΩ
82	R115	3001063330000	33KΩ

No.	Ref. No.	Part No.	Description
83	R138	3001063330000	33KΩ
84	R119	3001063930010	39KΩ
85	R229	3001054730010	47KΩ
86	R233	3001054730010	47KΩ
87	R247	3001064730000	47KΩ
88	R255	3001064730000	47KΩ
89	R102	3001051040000	100KΩ
90	R103	3001051040000	100KΩ
91	R116	3001061040000	100KΩ
92	R260	3001061040000	100KΩ
93	R271	3001061040000	100KΩ
94	R243	3001061540010	150KΩ
95	R236	3001056840000	680KΩ
96	C115	3101060590010	0.5PF
97	C154	3101060590010	0.5PF
98	C300	3101050100030	1PF
99	C173	3101060100010	1PF
100	C114	3101061590010	1.5PF
101	C151	3101061590010	1.5PF
102	C153	3101061590010	1.5PF
103	C168	3101061590010	1.5PF
104	C206	3101050200010	2PF
105	C208	3101050200010	2PF
106	C301	3101050200010	2PF
107	C101	3101060200010	2PF
108	C133	3101060200010	2PF
109	C159	3101060200010	2PF
110	C167	3101060200010	2PF
111	C169	3101060200010	2PF
112	C118	3101062490000	2.4PF
113	C125	3101062490000	2.4PF
114	C163	3101062490000	2.4PF
115	C164	3101062490000	2.4PF
116	C131	3101060300010	3PF
117	C150	3101060400010	4PF
118	C152	3101064790010	4.7PF
119	C111	3101060600010	6PF
120	C165	3101060600010	6PF
121	C112	3101060700020	7PF
122	C210	3101060800010	8PF
123	C215	3101060800010	8PF
124	C254	3101060800010	8PF

No.	Ref. No.	Part No.	Description
125	C309	3101060900010	9PF
126	C166	3101061000000	10PF
127	C229	3101061000000	10PF
128	C160	3101061500010	15PF
129	C128	3101061800000	18PF
130	C129	3101061800000	18PF
131	C130	3101062200010	22PF
132	C156	3101062200010	22PF
133	C120	3101062400010	24PF
134	C113	3101063300000	33PF
135	C141	3101063300000	33PF
136	C307	3101063300000	33PF
137	C116	3101064700000	47PF
138	C157	3101064700000	47PF
139	C212	3101051010030	100PF
140	C213	3101051010030	100PF
141	C216	3101051010030	100PF
142	C221	3101051010030	100PF
143	C222	3101051010030	100PF
144	C225	3101051010030	100PF
145	C228	3101051010030	100PF
146	C281	3101061010010	100PF
147	C282	3101061010010	100PF
148	C285	3101061010010	100PF
149	C288	3101061010010	100PF
150	C289	3101061010010	100PF
151	C296	3101061010010	100PF
152	C297	3101061010010	100PF
153	C298	3101061010010	100PF
154	C299	3101061010010	100PF
155	C239	3101061510000	150PF
156	C240	3101061510000	150PF
157	C108	3101062210000	220PF
158	C146	3101062210000	220PF
159	C251	3101062210000	220PF
160	C252	3101062210000	220PF
161	C306	3101062210000	220PF
162	C102	3101054710010	470PF
163	C103	3101054710010	470PF
164	C104	3101054710010	470PF
165	C203	3101054710010	470PF
166	C217	3101054710010	470PF

No.	Ref. No.	Part No.	Description
167	C278	3101054710010	470PF
168	C283	3101054710010	470PF
169	C105	3101064710000	470PF
170	C110	3101064710000	470PF
171	C117	3101064710000	470PF
172	C121	3101064710000	470PF
173	C123	3101064710000	470PF
174	C138	3101064710000	470PF
175	C148	3101064710000	470PF
176	C158	3101064710000	470PF
177	C161	3101064710000	470PF
178	C171	3101064710000	470PF
179	C262	3101064710000	470PF
180	C264	3101064710000	470PF
181	C268	3101064710000	470PF
182	C271	3101064710000	470PF
183	C272	3101064710000	470PF
184	C274	3101064710000	470PF
185	C275	3101064710000	470PF
186	C279	3101064710000	470PF
187	C286	3101064710000	470PF
188	C294	3101064710000	470PF
189	C201	3101051020010	1000PF
190	C219	3101051020010	1000PF
191	C232	3101051020010	1000PF
192	C236	3101051020010	1000PF
193	C241	3101051020010	1000PF
194	C245	3101051020010	1000PF
195	C246	3101051020010	1000PF
196	C250	3101051020010	1000PF
197	C127	3101061020000	1000PF
198	C255	3101061020000	1000PF
199	C256	3101061020000	1000PF
200	C257	3101061020000	1000PF
201	C258	3101061020000	1000PF
202	C265	3101061020000	1000PF
203	C266	3101061020000	1000PF
204	C290	3101061020000	1000PF
205	C291	3101061020000	1000PF
206	C292	3101061020000	1000PF
207	C293	3101061020000	1000PF
208	C302	3101061020000	1000PF

No.	Ref. No.	Part No.	Description
209	C303	3101061020000	1000PF
210	C304	3101061020000	1000PF
211	C305	3101061020000	1000PF
212	C209	3101051030020	0.01UF
213	C223	3101061030010	0.01UF
214	C224	3101062730000	0.027UF
215	C207	3101051040010	0.1UF
216	C211	3101051040010	0.1UF
217	C214	3101051040010	0.1UF
218	C220	3101051040010	0.1UF
219	C231	3101051040010	0.1UF
220	C234	3101051040010	0.1UF
221	C242	3101051040010	0.1UF
222	C243	3101051040010	0.1UF
223	C247	3101051040010	0.1UF
224	C248	3101051040010	0.1UF
225	C267	3101051040010	0.1UF
226	C284	3101051040010	0.1UF
227	C106	3101061040020	0.1UF
228	C109	3101061040020	0.1UF
229	C122	3101061040020	0.1UF
230	C124	3101061040020	0.1UF
231	C126	3101061040020	0.1UF
232	C139	3101061040020	0.1UF
233	C147	3101061040020	0.1UF
234	C162	3101061040020	0.1UF
235	C172	3101061040020	0.1UF
236	C174	3101061040020	0.1UF
237	C226	3101061040020	0.1UF
238	C227	3101061040020	0.1UF
239	C260	3101061040020	0.1UF
240	C261	3101061040020	0.1UF
241	C270	3101061040020	0.1UF
242	C276	3101061040020	0.1UF
243	C295	3101061040020	0.1UF
244	C308	3101061040020	0.1UF
245	C235	3101073340010	0.33UF
246	C204	3101051050160	1UF
247	C269	3101061050020	1UF
248	C287	3101061050020	1UF
249	C233	3101071050020	1UF
250	C132	3101074750000	4.7UF

No.	Ref. No.	Part No.	Description
251	C107	3104074750070	4.7UF
252	C273	3104074750070	4.7UF
253	C259	3104086850030	6.8UF
254	C230	3104071060070	10UF
255	C263	3104081060120	10UF
256	C277	3104081060120	10UF
257	L220	3210306229000	2.2nH
258	L221	3210306229000	2.2nH
259	L219	3217106829010	8.2nH
260	L222	3217106829010	8.2nH
261	L106	3217112100000	10nH
262	L119	3217112100000	10nH
263	L124	3217106120010	12nH
264	L125	3217106120010	12nH
265	L113	3217106150000	15nH
266	L126	3217106150000	15nH
267	L204	3217106180010	18nH
268	R148	3210306220000	22nH
269	R149	3210306220000	22nH
270	L123	3210306270000	27nH
271	L108	3214307270010	27nH
272	L120	3214307270010	27nH
273	L111	3217106470000	47nH
274	L112	3217106560000	56nH
275	L210	3217607391000	390nH
276	L101	3297107391000	390nH
277	L104	3297107391000	390nH
278	L105	3297107391000	390nH
279	L109	3297107391000	390nH
280	L115	3297107391000	390nH
281	L117	3297107391000	390nH
282	L118	3297107391000	390nH
283	L121	3297107391000	390nH
284	L207	3213306561000	0.56uH
285	L102	3221506601000	Ferrite bead
286	L103	3221506601000	Ferrite bead
287	L107	3221506601000	Ferrite bead
288	L110	3221506601000	Ferrite bead
289	L122	3221506601000	Ferrite bead
290	L127	3221506601000	Ferrite bead
291	L201	3221506601000	Ferrite bead
292	L202	3221506601000	Ferrite bead

No.	Ref. No.	Part No.	Description
293	L203	3221506601000	Ferrite bead
294	L205	3221506601000	Ferrite bead
295	L206	3221506601000	Ferrite bead
296	L208	3221506601000	Ferrite bead
297	L209	3221506601000	Ferrite bead
298	L211	3221506601000	Ferrite bead
299	L212	3221506601000	Ferrite bead
300	L213	3221506601000	Ferrite bead
301	L214	3221506601000	Ferrite bead
302	L215	3221506601000	Ferrite bead
303	L216	3221506601000	Ferrite bead
304	L217	3221506601000	Ferrite bead
305	L218	3221506601000	Ferrite bead
306	D101	3304010100200	Varactor
307	D103	3304010100200	Varactor
308	D104	3304010100200	Varactor
309	D105	3304010100200	Varactor
310	D107	3304010100200	Varactor
311	D108	3304010100200	Varactor
312	D109	3304010100200	Varactor
313	D110	3304010100200	Varactor
314	D102	3303240000000	Varactor
315	D202	3303240000000	Varactor
316	D112	3304010100890	Varactor
317	Q101	3408002000080	NPN transistor
318	Q107	3408002000080	NPN transistor
319	Q105	3404006000000	NPN transistor
320	Q106	3404006000000	NPN transistor
321	Q108	3404999000000	NPN transistor
322	Q103	3499000000150	Composite transistor
323	Q104	3403003000060	NPN transistor
324	Q202	3403002000000	PNP transistor
325	Q203	3403008000010	Bias resistor transistor
326	Q102	3503010000010	P-MOSFET
327	U202	3604019000000	PLL IC
328	U203	3616010000000	Switch IC
329	U204	3616010000000	Switch IC
330	U205	3616059000000	Switch IC
331	U207	3608006000000	Power management IC
332	U208	3608020000000	Power management IC
333	U209	3605002057090	Operational amplifier
334	X201	3701019250060	Temperature compensated crystal oscillator

Receiver Board

No.	Ref. No.	Part No.	Description
1	R141	3001050000000	0Ω
2	R160	3001050000000	0Ω
3	R166	3001050000000	0Ω
4	R167	3001050000000	0Ω
5	R168	3001050000000	0Ω
6	R510	3001050000000	0Ω
7	R513	3001050000000	0Ω
8	R515	3001050000000	0Ω
9	R516	3001050000000	0Ω
10	L116	3001060000000	0Ω
11	L423	3001060000000	0Ω
12	L433	3001060000000	0Ω
13	L519	3001060000000	0Ω
14	L612	3001060000000	0Ω
15	R119	3001060000000	0Ω
16	R121	3001060000000	0Ω
17	R139	3001060000000	0Ω
18	R409	3001060000000	0Ω
19	R420	3001060000000	0Ω
20	R427	3001060000000	0Ω
21	R453	3001060000000	0Ω
22	R502	3001060000000	0Ω
23	R609	3001060000000	0Ω
24	R615	3001060000000	0Ω
25	R619	3001060000000	0Ω
26	R622	3001060000000	0Ω
27	R623	3001060000000	0Ω
28	R129	3001051000000	10Ω
29	R133	3001051000000	10Ω
30	R429	3001060100000	1Ω
31	R441	3001060100000	1Ω
32	R455	3001061200000	12Ω
33	R107	3001061000000	10Ω
34	R109	3001061000000	10Ω
35	R436	3001061000000	10Ω
36	R130	3001051010000	100Ω
37	R132	3001051010000	100Ω
38	R106	3001061010000	100Ω
39	R117	3001061010000	100Ω
40	R437	3001061010000	100Ω

No.	Ref. No.	Part No.	Description
41	R438	3001061010000	100Ω
42	R454	3001061010000	100Ω
43	R608	3001061010000	100Ω
44	R610	3001061010000	100Ω
45	R614	3001061010000	100Ω
46	R618	3001061010000	100Ω
47	R626	3001061010000	100Ω
48	R627	3001061010000	100Ω
49	R632	3001061010000	100Ω
50	R633	3001061010000	100Ω
51	R136	3001051020000	1KΩ
52	R145	3001051020000	1KΩ
53	R150	3001051020000	1KΩ
54	R154	3001051020000	1KΩ
55	R158	3001051020000	1KΩ
56	R161	3001051020000	1KΩ
57	R607	3001061020010	1KΩ
58	R613	3001061020010	1KΩ
59	R616	3001061020010	1KΩ
60	R620	3001061020010	1KΩ
61	R624	3001061020010	1KΩ
62	R625	3001061020010	1KΩ
63	R628	3001061020010	1KΩ
64	R134	3001051030000	10KΩ
65	R144	3001051030000	10KΩ
66	R147	3001051030000	10KΩ
67	R124	3001061030010	10KΩ
68	R404	3001061030010	10KΩ
69	R152	3001051040000	100KΩ
70	R423	3001051040000	100KΩ
71	R456	3001051040000	100KΩ
72	R457	3001051040000	100KΩ
73	R458	3001051040000	100KΩ
74	R459	3001051040000	100KΩ
75	R460	3001051040000	100KΩ
76	R514	3001051040000	100KΩ
77	R102	3001061040010	100KΩ
78	R104	3001061040010	100KΩ
79	R405	3001061040010	100KΩ
80	R406	3001061040010	100KΩ
81	R407	3001061040010	100KΩ
82	R410	3001061040010	100KΩ

No.	Ref. No.	Part No.	Description
83	R412	3001061040010	100KΩ
84	R413	3001061040010	100KΩ
85	R414	3001061040010	100KΩ
86	R416	3001061040010	100KΩ
87	R417	3001061040010	100KΩ
88	R418	3001061040010	100KΩ
89	R509	3001051220000	1.2KΩ
90	R425	3001061220000	1.2KΩ
91	R430	3001061220000	1.2KΩ
92	R125	3001061500000	15Ω
93	R127	3001061500000	15Ω
94	R143	3001061500000	15Ω
95	R506	3001051510000	150Ω
96	R612	3001061520000	1.5KΩ
97	R617	3001061520000	1.5KΩ
98	R114	3001061530010	15KΩ
99	R115	3001061530010	15KΩ
100	R518	3001051820000	1.8KΩ
101	R151	3001051840000	180KΩ
102	R450	3001062030000	20KΩ
103	R122	3001062210000	220Ω
104	R123	3001062210000	220Ω
105	R118	3001062700000	27Ω
106	R108	3001061510000	150Ω
107	R128	3001061510000	150Ω
108	R504	3001052720000	2.7KΩ
109	R448	3001063030000	30KΩ
110	R451	3001063030000	30KΩ
111	R512	3001052210000	220Ω
112	R439	3001063310010	330Ω
113	R445	3001063310010	330Ω
114	R111	3001052220000	2.2KΩ
115	R142	3001061210000	120Ω
116	R419	3001065690000	5.6Ω
117	R110	3001063320000	3.3KΩ
118	R113	3001063320000	3.3KΩ
119	R426	3001063620000	3.6KΩ
120	R101	3001064320000	4.3KΩ
121	R501	3001054720000	4.7KΩ
122	R507	3001054720000	4.7KΩ
123	R103	3001064720000	4.7KΩ
124	R112	3001064720000	4.7KΩ

No.	Ref. No.	Part No.	Description
125	R447	3001064720000	4.7KΩ
126	R149	3001054730000	47KΩ
127	R153	3001054730000	47KΩ
128	R606	3001064730000	47KΩ
129	R611	3001064730000	47KΩ
130	R621	3001064730000	47KΩ
131	R629	3001064730000	47KΩ
132	R630	3001064730000	47KΩ
133	R631	3001064730000	47KΩ
134	R635	3001064730000	47KΩ
135	R135	3001055100020	51Ω
136	R137	3001055100020	51Ω
137	R140	3001055100020	51Ω
138	R503	3001055100020	51Ω
139	R524	3001055100020	51Ω
140	R431	3001065100000	51Ω
141	R446	3001065100000	51Ω
142	R449	3001065100000	51Ω
143	R520	3001055110000	510Ω
144	R444	3001065120000	5.1KΩ
145	R508	3001055610000	560Ω
146	R505	3001055620000	5.6KΩ
147	R519	3001055620000	5.6KΩ
148	R452	3001065630000	56KΩ
149	R138	3001066800000	68Ω
150	R126	3001066820000	6.8KΩ
151	R421	3001068210010	820Ω
152	R422	3001068210010	820Ω
153	R434	3001068210010	820Ω
154	R435	3001068210010	820Ω
155	R440	3001068210010	820Ω
156	R442	3001068210010	820Ω
157	R443	3001068210010	820Ω
158	R411	3001071010000	100Ω
159	R424	3001071010000	100Ω
160	R428	3001071010000	100Ω
161	R468	3001071010000	100Ω
162	R511	3001058220000	8.2KΩ
163	R105	3001068220000	8.2KΩ
164	R116	3001068220000	8.2KΩ
165	C182	3101051000020	10PF
166	C183	3101051000020	10PF

No.	Ref. No.	Part No.	Description
167	C116	3101060100010	1PF
168	C113	3101061000000	10PF
169	C434	3101061000000	10PF
170	C440	3101061000000	10PF
171	C470	3101061000000	10PF
172	C471	3101061000000	10PF
173	C157	3101051010030	100PF
174	C159	3101051010030	100PF
175	C164	3101051010030	100PF
176	C171	3101051010030	100PF
177	C172	3101051010030	100PF
178	C173	3101051010030	100PF
179	C175	3101051010030	100PF
180	C528	3101051010030	100PF
181	C529	3101051010030	100PF
182	C538	3101051010030	100PF
183	C539	3101051010030	100PF
184	C423	3101061010010	100PF
185	C424	3101061010010	100PF
186	C425	3101061010010	100PF
187	C430	3101061010010	100PF
188	C464	3101061010010	100PF
189	C486	3101061010010	100PF
190	C488	3101061010010	100PF
191	C493	3101061010010	100PF
192	C627	3101061010010	100PF
193	C628	3101061010010	100PF
194	C631	3101061010010	100PF
195	C632	3101061010010	100PF
196	C637	3101061010010	100PF
197	C638	3101061010010	100PF
198	C639	3101061010010	100PF
199	C640	3101061010010	100PF
200	C651	3101061010010	100PF
201	C652	3101061010010	100PF
202	C653	3101061010010	100PF
203	C654	3101061010010	100PF
204	C679	3101061010010	100PF
205	C680	3101061010010	100PF
206	C681	3101061010010	100PF
207	C682	3101061010010	100PF
208	C151	3101051020010	1000PF

No.	Ref. No.	Part No.	Description
209	C162	3101051020010	1000PF
210	C168	3101051020010	1000PF
211	C185	3101051020010	1000PF
212	C195	3101051020010	1000PF
213	C196	3101051020010	1000PF
214	C509	3101051020010	1000PF
215	C515	3101051020010	1000PF
216	C525	3101051020010	1000PF
217	C531	3101051020010	1000PF
218	C407	3101061020000	1000PF
219	C408	3101061020000	1000PF
220	C485	3101061020000	1000PF
221	C499	3101061020000	1000PF
222	C602	3101061020000	1000PF
223	C603	3101061020000	1000PF
224	C605	3101061020000	1000PF
225	C614	3101061020000	1000PF
226	C615	3101061020000	1000PF
227	C617	3101061020000	1000PF
228	C625	3101061020000	1000PF
229	C626	3101061020000	1000PF
230	C633	3101061020000	1000PF
231	C635	3101061020000	1000PF
232	C636	3101061020000	1000PF
233	C641	3101061020000	1000PF
234	C642	3101061020000	1000PF
235	C643	3101061020000	1000PF
236	C644	3101061020000	1000PF
237	C647	3101061020000	1000PF
238	C650	3101061020000	1000PF
239	C655	3101061020000	1000PF
240	C656	3101061020000	1000PF
241	C660	3101061020000	1000PF
242	C661	3101061020000	1000PF
243	C663	3101061020000	1000PF
244	C666	3101061020000	1000PF
245	C668	3101061020000	1000PF
246	C669	3101061020000	1000PF
247	C671	3101061020000	1000PF
248	C672	3101061020000	1000PF
249	C674	3101061020000	1000PF
250	C675	3101061020000	1000PF

No.	Ref. No.	Part No.	Description
251	C677	3101061020000	1000PF
252	C678	3101061020000	1000PF
253	C683	3101061020000	1000PF
254	C684	3101061020000	1000PF
255	C685	3101061020000	1000PF
256	C155	3101051030020	0.01UF
257	C504	3101051030020	0.01UF
258	C512	3101051030020	0.01UF
259	C519	3101051030020	0.01UF
260	C535	3101051030020	0.01UF
261	C405	3101061030010	0.01UF
262	C457	3101061030010	0.01UF
263	C152	3101051040060	0.1UF
264	C153	3101051040060	0.1UF
265	C156	3101051040060	0.1UF
266	C158	3101051040060	0.1UF
267	C169	3101051040060	0.1UF
268	C179	3101051040060	0.1UF
269	C180	3101051040060	0.1UF
270	C181	3101051040060	0.1UF
271	C184	3101051040060	0.1UF
272	C194	3101051040060	0.1UF
273	C197	3101051040060	0.1UF
274	C505	3101051040060	0.1UF
275	C506	3101051040060	0.1UF
276	C510	3101051040060	0.1UF
277	C511	3101051040060	0.1UF
278	C514	3101051040060	0.1UF
279	C516	3101051040060	0.1UF
280	C533	3101051040060	0.1UF
281	C534	3101051040060	0.1UF
282	C536	3101051040060	0.1UF
283	C537	3101051040060	0.1UF
284	C540	3101051040060	0.1UF
285	C541	3101051040060	0.1UF
286	C546	3101051040060	0.1UF
287	C547	3101051040060	0.1UF
288	C102	3101061040010	0.1UF
289	C104	3101061040010	0.1UF
290	C107	3101061040010	0.1UF
291	C123	3101061040010	0.1UF
292	C126	3101061040010	0.1UF

No.	Ref. No.	Part No.	Description
293	C129	3101061040010	0.1UF
294	C165	3101061040010	0.1UF
295	C401	3101061040010	0.1UF
296	C409	3101061040010	0.1UF
297	C411	3101061040010	0.1UF
298	C467	3101061040010	0.1UF
299	C468	3101061040010	0.1UF
300	C473	3101061040010	0.1UF
301	C474	3101061040010	0.1UF
302	C475	3101061040010	0.1UF
303	C482	3101061040010	0.1UF
304	C483	3101061040010	0.1UF
305	C604	3101061040010	0.1UF
306	C606	3101061040010	0.1UF
307	C618	3101061040010	0.1UF
308	C623	3101061040010	0.1UF
309	C648	3101061040010	0.1UF
310	C658	3101061040010	0.1UF
311	C659	3101061040010	0.1UF
312	C667	3101061040010	0.1UF
313	C673	3101061040010	0.1UF
314	L424	3101061040010	0.1UF
315	C543	3101051050160	1uF
316	C550	3101051050160	1uF
317	C601	3101061050020	1UF
318	C613	3101061050020	1UF
319	C616	3101061050020	1UF
320	C634	3101061050020	1UF
321	C645	3101061050020	1UF
322	C646	3101061050020	1UF
323	C649	3101061050020	1UF
324	C657	3101061050020	1UF
325	C662	3101061050020	1UF
326	C670	3101061050020	1UF
327	C676	3101061050020	1UF
328	C664	3101081060010	10UF
329	C665	3101081060010	10UF
330	C427	3101061200000	12PF
331	C481	3101061200000	12PF
332	C523	3101051500020	15PF
333	C119	3101061500010	15PF
334	C420	3101061500010	15PF

No.	Ref. No.	Part No.	Description
335	L430	3101061500010	15PF
336	C462	3101061590010	1.5PF
337	C545	3101055600000	56PF
338	C161	3101051800010	18PF
339	C524	3101051800010	18PF
340	R157	3101051800010	18PF
341	C150	3101061800000	18PF
342	C487	3101061800000	18PF
343	C518	3101051810020	180PF
344	C527	3101052200010	22PF
345	C530	3101052200010	22PF
346	C542	3101052200010	22PF
347	C134	3101062200010	22PF
348	C503	3101052210020	220PF
349	C109	3101062210000	220PF
350	C117	3101062210000	220PF
351	C131	3101062210000	220PF
352	C148	3101062210000	220PF
353	C402	3101062210000	220PF
354	C410	3101062210000	220PF
355	C412	3101062210000	220PF
356	C466	3101062210000	220PF
357	C460	3101062490000	2.4PF
358	C114	3101062700010	27PF
359	C144	3101062700010	27PF
360	C465	3101062700010	27PF
361	C133	3101060300010	3PF
362	C135	3101060300010	3PF
363	C136	3101060300010	3PF
364	C142	3101060300010	3PF
365	C441	3101060300010	3PF
366	C508	3101050300000	3PF
367	C532	3101053000010	30PF
368	C112	3101063590000	3.5PF
369	C115	3101063590000	3.5PF
370	C149	3101063590000	3.5PF
371	C111	3101063690000	3.6PF
372	C139	3101063690000	3.6PF
373	C143	3101063690000	3.6PF
374	C416	3101063690000	3.6PF
375	C417	3101063690000	3.6PF
376	C418	3101063690000	3.6PF

No.	Ref. No.	Part No.	Description
377	C421	3101063690000	3.6PF
378	C422	3101063690000	3.6PF
379	C426	3101063690000	3.6PF
380	C428	3101063690000	3.6PF
381	C429	3101063690000	3.6PF
382	C437	3101063690000	3.6PF
383	C472	3101063690000	3.6PF
384	C127	3101063300000	33PF
385	C137	3101063300000	33PF
386	C118	3101063900000	39PF
387	C517	3101053920000	3900PF
388	C415	3101060400010	4PF
389	C435	3101060400010	4PF
390	C501	3101054700010	47PF
391	C556	3101054700010	47PF
392	C147	3101064700000	47PF
393	C163	3101054710010	470PF
394	C198	3101054710010	470PF
395	C507	3101054710010	470PF
396	C513	3101054710010	470PF
397	C521	3101054710010	470PF
398	C549	3101054710010	470PF
399	C101	3101064710000	470PF
400	C103	3101064710000	470PF
401	C105	3101064710000	470PF
402	C106	3101064710000	470PF
403	C108	3101064710000	470PF
404	C122	3101064710000	470PF
405	C125	3101064710000	470PF
406	C130	3101064710000	470PF
407	C456	3101064710000	470PF
408	C458	3101064710000	470PF
409	C121	3101051040010	0.1UF
410	C186	3101051590000	1.5PF
411	C166	3101062240000	0.22UF
412	C176	3101071050160	1UF
413	C160	3101050700010	7PF
414	C128	3101060500010	5PF
415	C132	3101060500010	5PF
416	C442	3101060500010	5PF
417	C443	3101060500010	5PF
418	C469	3101060500010	5PF

No.	Ref. No.	Part No.	Description
419	C140	3101060900010	9PF
420	C433	3101060900010	9PF
421	C439	3101060900010	9PF
422	C476	3101060900010	9PF
423	C526	3101050600010	6PF
424	C436	3101060600010	6PF
425	R432	3101060600010	6PF
426	C170	3101066830000	0.068UF
427	C190	3101066830000	0.068UF
428	C432	3101060800010	8PF
429	C438	3101060800010	8PF
430	C431	3101060200010	2PF
431	C461	3101060200010	2PF
432	C522	3101072240000	0.22UF
433	C189	3101074740000	0.47UF
434	C548	3104071050070	1UF
435	C110	3104074750070	4.7UF
436	C178	3104071060070	10UF
437	C520	3104071060070	10UF
438	L110	3217106121000	120nH
439	L416	3210209102010	1uH
440	L505	3213212103000	10uH
441	L506	3213212103000	10uH
442	R155	3210105100000	10nH
443	L419	3217106150000	15nH
444	L420	3217106150000	15nH
445	L421	3217106150000	15nH
446	L106	3237199120000	12.5nH
447	L117	3237199080000	8nH
448	L404	3217106120010	12nH
449	L405	3217106120010	12nH
450	L406	3217107120000	12nH
451	L407	3217107120000	12nH
452	L408	3217107120000	12nH
453	L409	3217107120000	12nH
454	L410	3217107120000	12nH
455	L411	3217107120000	12nH
456	L413	3217107120000	12nH
457	L414	3217107120000	12nH
458	L415	3217107120000	12nH
459	L124	3210106150000	15nH
460	L412	3210106150000	15nH

No.	Ref. No.	Part No.	Description
461	L403	3213209151000	150nH
462	L113	3210306180000	18nH
463	L429	3212206181000	180nH
464	L507	3217607221000	220nH
465	L516	3213212332000	3.3uH
466	L418	3210306220000	22nH
467	L119	3214307270010	27nH
468	L107	3217607330000	33nH
469	C479	3210406331000	330nH
470	L425	3210406331000	330nH
471	L517	3210406331000	330nH
472	L518	3213306332000	3.3uH
473	L112	3210306470000	47nH
474	L427	3210306470000	47nH
475	L511	3210406471000	470nH
476	L101	3217107471010	470nH
477	L104	3217107471010	470nH
478	L105	3217107471010	470nH
479	L109	3217107471010	470nH
480	L111	3217107471010	470nH
481	L114	3217107471010	470nH
482	L118	3217107471010	470nH
483	L120	3217107471010	470nH
484	L610	3213209471000	470nH
485	L128	3213306561000	0.56uH
486	R517	3213306561000	0.56uH
487	L102	3221506601000	Ferrite bead
488	L103	3221506601000	Ferrite bead
489	L108	3221506601000	Ferrite bead
490	L121	3221506601000	Ferrite bead
491	L122	3221506601000	Ferrite bead
492	L123	3221506601000	Ferrite bead
493	L125	3221506601000	Ferrite bead
494	L126	3221506601000	Ferrite bead
495	L127	3221506601000	Ferrite bead
496	L401	3221506601000	Ferrite bead
497	L402	3221506601000	Ferrite bead
498	L417	3221506601000	Ferrite bead
499	L422	3221506601000	Ferrite bead
500	L501	3221506601000	Ferrite bead
501	L502	3221506601000	Ferrite bead
502	L503	3221506601000	Ferrite bead

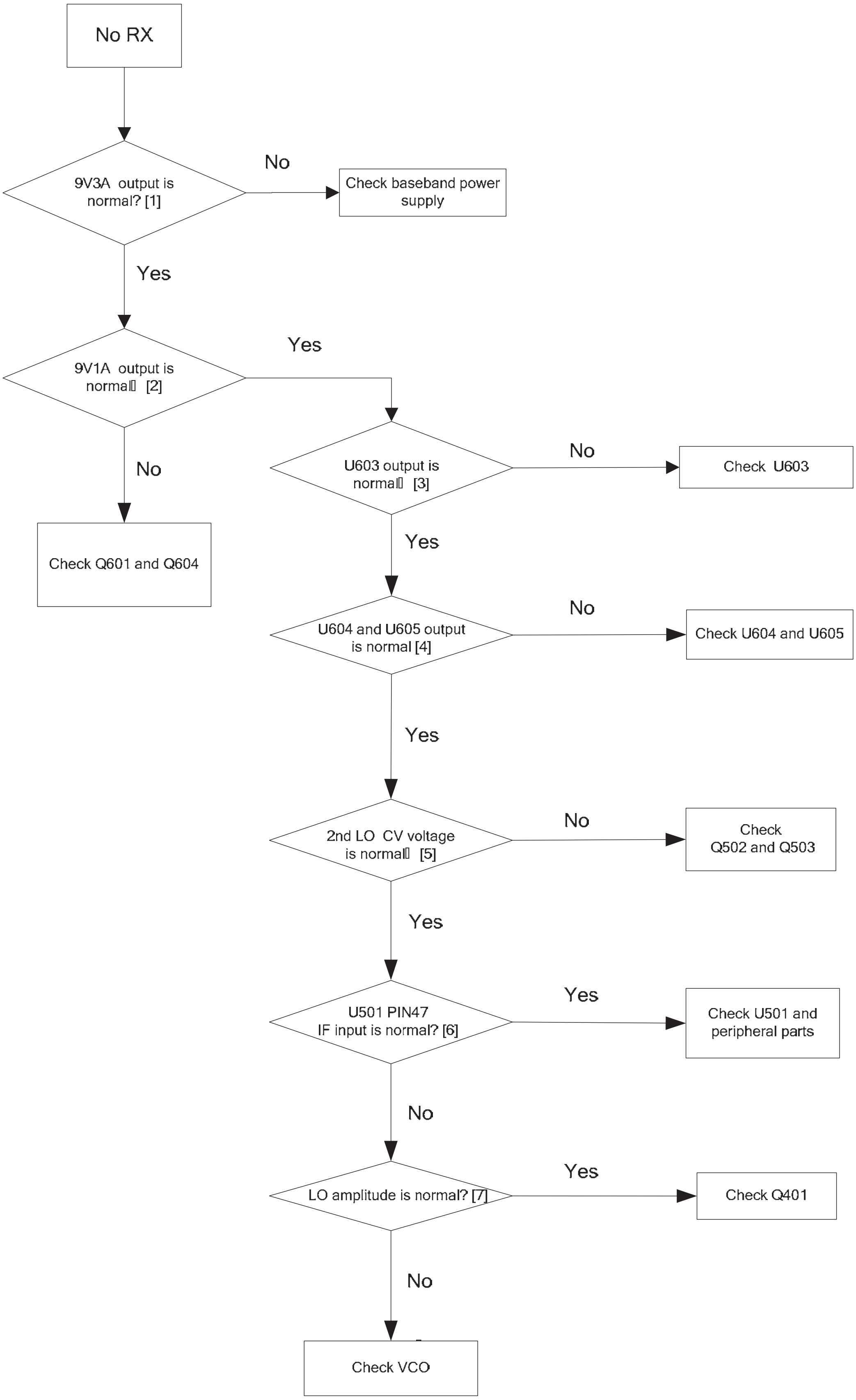
No.	Ref. No.	Part No.	Description
503	L504	3221506601000	Ferrite bead
504	L508	3221506601000	Ferrite bead
505	L509	3221506601000	Ferrite bead
506	L510	3221506601000	Ferrite bead
507	L512	3221506601000	Ferrite bead
508	L513	3221506601000	Ferrite bead
509	L514	3221506601000	Ferrite bead
510	L515	3221506601000	Ferrite bead
511	L601	3221506601000	Ferrite bead
512	L602	3221506601000	Ferrite bead
513	L603	3221506601000	Ferrite bead
514	L604	3221506601000	Ferrite bead
515	L605	3221506601000	Ferrite bead
516	L606	3221506601000	Ferrite bead
517	L607	3221506601000	Ferrite bead
518	L608	3221506601000	Ferrite bead
519	L609	3221506601000	Ferrite bead
520	L611	3221506601000	Ferrite bead
521	L426	3213306821000	0.82uH
522	D102	3303240000000	Switching diode
523	D110	3303240000000	Switching diode
524	D501	3303240000000	Switching diode
525	D401	3304010100890	Varactor
526	D402	3304010100890	Varactor
527	D403	3304010100890	Varactor
528	D405	3304010100890	Varactor
529	D406	3304010100890	Varactor
530	D407	3304010100890	Varactor
531	D409	3304010100890	Varactor
532	D410	3304010100890	Varactor
533	D411	3304010100890	Varactor
534	D412	3304010100890	Varactor
535	D413	3304010100890	Varactor
536	D414	3304010100890	Varactor
537	D415	3304010100890	Varactor
538	D416	3304010100890	Varactor
539	D417	3304010100890	Varactor
540	D418	3304010100890	Varactor
541	D419	3304010100890	Varactor
542	D420	3304010100890	Varactor
543	D421	3304010100890	Varactor
544	D422	3304010100890	Varactor

No.	Ref. No.	Part No.	Description
545	D423	3304010100890	Varactor
546	D424	3304010100890	Varactor
547	D425	3304010100890	Varactor
548	D426	3304010100890	Varactor
549	D101	3304060300050	Varactor
550	D103	3304060300050	Varactor
551	D104	3304060300050	Varactor
552	D105	3304060300050	Varactor
553	D106	3304060300050	Varactor
554	D107	3304060300050	Varactor
555	D108	3304060300050	Varactor
556	D109	3304060300050	Varactor
557	D502	3304060300050	Varactor
558	D503	3304060300010	Varactor
559	D404	3399990000260	Rectifier diode
560	D408	3399990000260	Rectifier diode
561	Q102	3503010000010	P-MOSFET
562	Q101	3408002000080	NPN transistor
563	Q107	3408002000080	NPN transistor
564	Q105	3404006000000	NPN transistor
565	Q106	3404006000000	NPN transistor
566	Q402	3404006000000	NPN transistor
567	Q403	3404006000000	NPN transistor
568	Q401	3404999000000	NPN transistor
569	Q104	3403003000060	NPN transistor
570	Q502	3403003000060	NPN transistor
571	Q601	3403002000000	PNP transistor
572	Q604	3403002000000	PNP transistor
573	Q503	3408002000000	NPN transistor
574	Q602	3403008000010	Bias resistor transistor
575	Q603	3403008000010	Bias resistor transistor
576	U402	3601039000060	LNA amplifier
577	U602	3608015000060	Power management IC
578	U603	3608015000060	Power management IC
579	U606	3608015000060	Power management IC
580	U601	3608006000000	Power management IC
581	U604	3608006000000	Power management IC
582	U605	3608006000000	Power management IC
583	U105	3616010000000	Switch IC
584	U101	3604019000000	PLL IC
585	U103	3616059000000	Switch IC
586	U106	3605002057090	Operational amplifier

No.	Ref. No.	Part No.	Description
587	U403	3609014000010	Mixer
588	U501	3603999000000	IF processor IC
589	U401	3605008001690	Operational amplifier
590	Q103	3499000000150	Composite transistor
591	X101	3701019250030	Temperature compensated crystal oscillator
592	Z401	3802733540030	Crystal filter

10.8 Troubleshooting Flow Chart

Receiver Circuit



Description of Normal Situations:

[1] About 9.3V for receiver board.

[2] About 9.1V for pin 2 of Q601 and Q604.

[3] About 5V for pin 5 of U603.

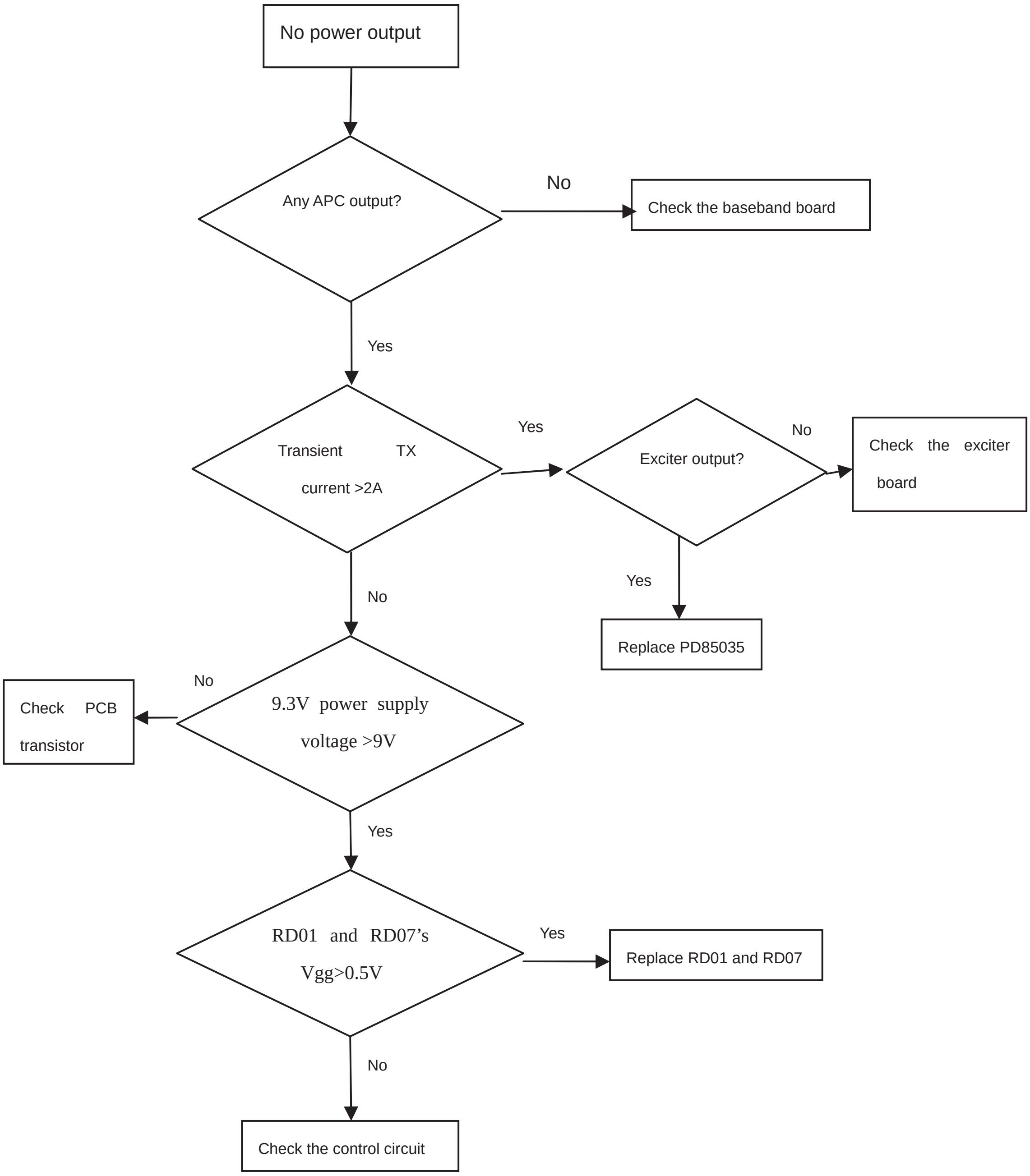
[4] About 3.3V for pin 5 of U604 and U605.

[5] Normal CV voltage is 0.7-1.5V. The test point is TP504.

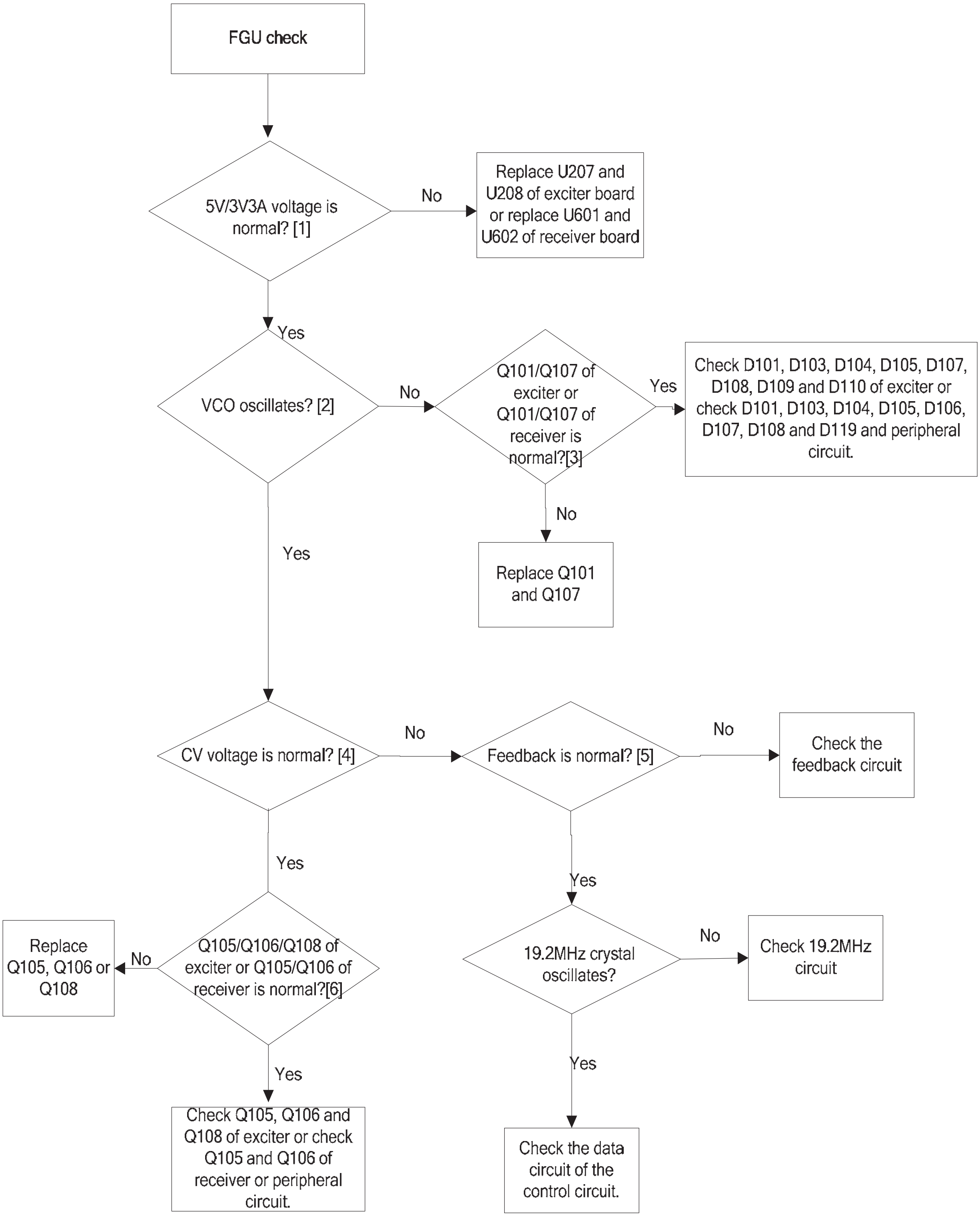
[6] Disconnect the front-end circuit and input 73.35MHz IF signal at pin 47 of U501; the sensitivity should be about-107dBm.

[7] Amplitude of 1st LO is 16-19dBm.

Transmitter Circuit



FGU Circuit



FGU check
5V/3V3A voltage is normal? [1]
No
Replace U207 and U208 of exciter board or replace U601 and U602 of receiver board
Yes
VCO oscillates? [2]
No
Q101/Q107 of exciter or Q101/Q107 of receiver is normal?[3]
Yes
Check D101, D103, D104, D105, D107, D108, D109 and D110 of exciter or check D101, D103, D104, D105, D106, D107, D108 and D119 and peripheral circuit.
No
Replace Q101 and Q107
Yes
CV voltage is normal? [4]
No
Feedback is normal? [5]
No
Check the feedback circuit
Yes
Yes
Q105/Q106/Q108 of exciter or Q105/Q106 of receiver is normal?[6]
No
Replace Q105, Q106 or Q108
19.2MHz crystal oscillates?
No
Check 19.2MHz circuit
Yes
Check Q105, Q106 and Q108 of exciter or check Q105 and Q106 of receiver or peripheral circuit.
Yes
Check the data circuit of the control circuit.

Description of Normal Situations:

[1] VCO: 5V; PLL: 3.3V;

[2] Frequency output for low VCO is 435～500MHz, and 470～535MHz for high VCO. The power output amplitude for both is -8～18dBm;

[3] CV voltage of Q101 and Q107: about 4V; the voltage difference between base voltage and emitter voltage is about 0.6V;

[4] Normal CV voltage is 0.6V-4.4V;

[5] Normal feedback amplitude is -8～-17dBm;

[6] CV voltage of Q105, Q106 and Q108: about 6V; the voltage difference between base voltage and emitter voltage is about 0.6V;

11.UHF3 (350-400MHz) Information

11.1 TX Circuit

The TX circuit consists of power amplifier (PA) circuit, power control circuit, diagnosis and detection circuit and protection circuit. It is to amplify the RF signal from exciter module to 50W, which then will be output via the antenna. The power control circuit is used for keeping the RF power of antenna at a fixed level. For the diagnosis and detection circuit, it detects the current TX power, antenna VSWR and transmitter temperature, and sends the detection result to the repeater’s control unit for monitoring the transmitter status. The role of protection circuit is to protect the power amplifier from being damaged due to high temperature or VSWR.

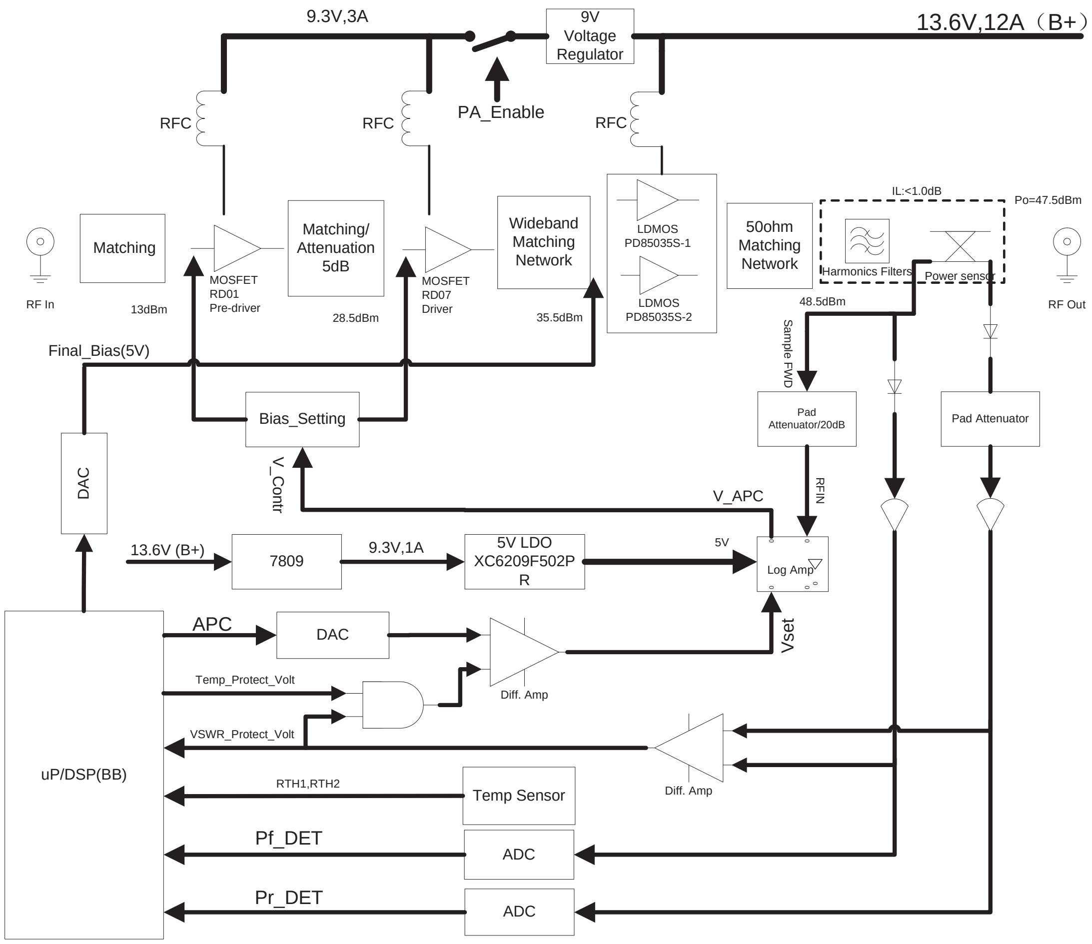


Figure 11-1 Block Diagram of PA Board

PA Module

PA module of transmitter consists of a 3-stage PA unit: pre-driver stage (Q401), driver stage (Q402) and final-stage (Q403 and Q404). Q401 and Q402 form the driver circuit, whose gain can be adjusted via the APC circuit, ensuring a constant RF power output of 50W.

Pre-driver Stage PA

This PA unit is a LDMOS power tube (Q401). It can amplify the 13dBm RF signals from exciter unit to 30dBm, which then will be sent to driver-stage PA via L-C network.

Driver Stage PA

This PA unit is a LDMOS power tube (Q402). It can further amplify the RF signals from Q401 to 38dBm, which is then sent to final-stage PA.

Final-stage PA

This PA unit consists of two LDMOS power tubes (Q403 and Q404). It can reduce the Q value of power input/output network and expand the bandwidth of PA circuit, ensuring PA circuit performance.

Harmonic Suppression filter

The harmonic filter of transmitter is a four-order LPF filter comprising C452, L410, C456, C542, L412, C459, C460, C461, C462, L413, C465, L414 and C466. It can decrease the harmonic component by increasing the out-of-band rejection capability.

Directional Coupler

The role of directional coupler is to detect forward and reverse power, so as to monitor and diagnose the operating status of transmitter. The forward power passes through a π-type attenuator, and then goes into the logarithmic amplifier, where it can automatically limit the output power of the transmitter to a relatively constant value (50W) according to the preset power level “Vset”. After going to the analog-to-digital converter (ADC) on the baseband board via the diode D402, the forward power is used to calculate the current TX power of the transmitter, which will be displayed in the diagnosis software in a real-time way. The directional coupler locates behind the LPF and is near the antenna output end. It is used to detect the reverse power. After going to the ADC on the baseboard via the diode D401, the reverse power is used to calculate the VSWR of antenna connector. An alarm will be generated when the VSWR is larger than the set threshold. Both forward and reverse detection voltages are calculated via a differential amplifier circuit (U407A). The output value is used to control the power level “Vset”. When the VSWR is too high, the TX power will be reduced to avoid damage to the PA.

Power Control

The transmitter power is controlled by power control circuit composed of logarithmic amplifier and directional coupler. After the transmitter power passes through the directional coupler, the detected RF signal goes to RF_IN of logarithmic amplifier via the Pi-type attenuator. Then the detected RF signal will adjust the output “Vapc” of logarithmic amplifier in a real time way based on the current power level “Vset”, so as to control the bias voltage at the gates of Q401 and Q402 and to ensure a constant output

power.

Temperature Protection

The thermistor RT402 is close to the heat sink pad of the final-stage amplifier, and is used to detect the current temperature of the heat sink. When the temperature of heat sink rises to the default value, the fan will run; when the temperature drops to a certain level, the fan will stop running.

When the temperature is above ℃, the control unit will send an alarm signal. If the temperature rises continuously, the temperature protection circuit (U407B) will output a control voltage, to reduce the power level Vset, thus reducing the transmitter power and protecting the PA. When the temperature falls below ℃, Vset and transmitter power will restore to their normal levels. Naturally, the alarm will dissolve.

Low-voltage and Over-voltage Protection

The control unit detects the voltage of system power supply in a real time way. When the voltage is below 12V, the control unit will reduce the TX power to 30W, ensuring no damage to the driver amplifier of transmitter. When the voltage is above 14.6V, it will reduce the power level to 40W, ensuring no damage to the final-stage amplifier of transmitter.

11.2 RX Circuit

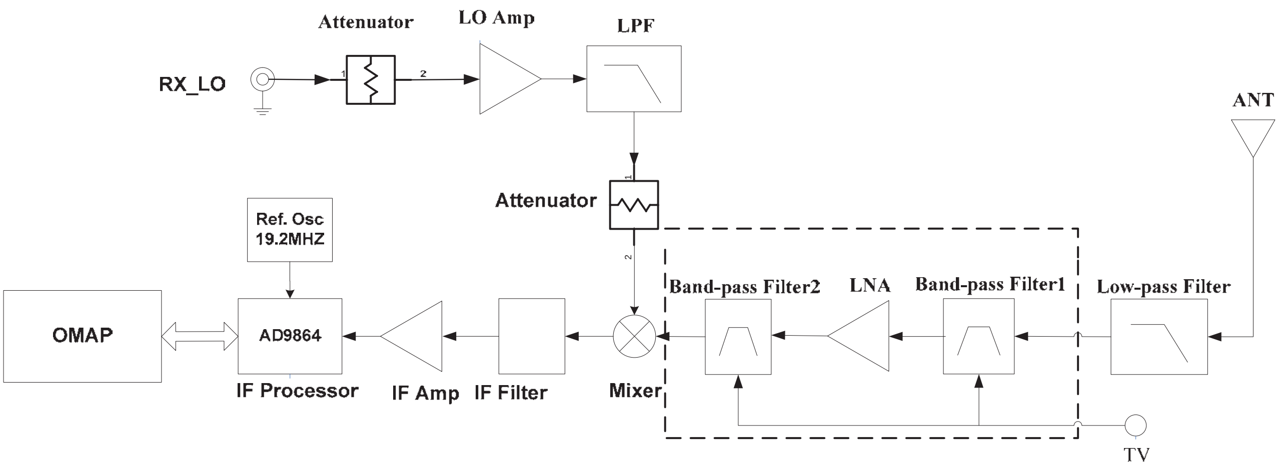


Figure 11-2 Block Diagram of Receiver Circuit

The receiver circuit mainly comprises the RF band-pass filter, low-noise amplifier, mixer, IF filter, IF amplifier and IF processor.

Front-end Circuit

The HF signal from the low-pass filter passes through the electrically tunable band-pass filter controlled via TV level, to remove out-of-band interference signal and to send wanted band-pass signal to the low-noise amplifier (U402). The amplified signal goes to a band-pass filter controlled via TV level, to

remove out-of-band interference signal generated during amplification, and to send wanted HF signal to the mixer.

The wanted signal passes through the RF band-pass filter and low-noise amplifier and goes to the mixer (U403). Meanwhile, the first local oscillator (LO) signal generated by VCO passes through the low-pass filter and also goes to the mixer. In the mixer, the wanted signal and the first LO signal are mixed to generate the first IF signal (73.35MHz). Then the signal passes through the LC to suppress carrier other than the first IF signal, and to increase the isolation between the mixer and the IF filter. After that, the first IF signal goes to crystal filter (Z401) for filtering, and is sent to the two-stage IF amplifier circuit for amplification. Then the amplified signal goes to the IF processor U501 for further processing.

Rear-end Circuit

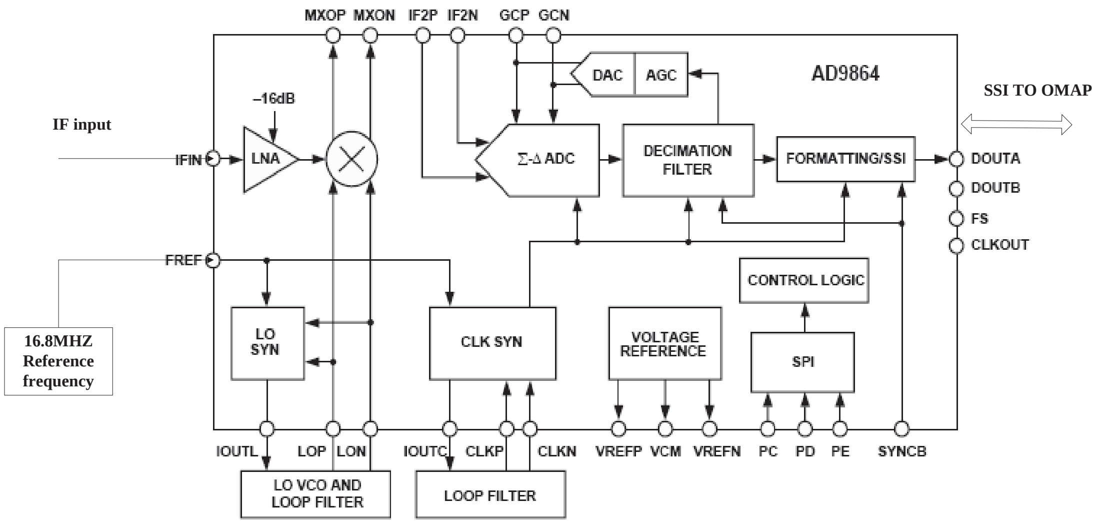


Figure 11-3 Diagram of IF Processor

The first IF signal (73.35MHz) output by the IF amplifier goes into U501 via Pin 47, where the signal is converted to the second IF signal (2.25MHz). Then the signal is converted to digital signal via ADC sampling, and output via the SSI interface. Finally, the digital signal is sent to DSP (OMAP5912) for demodulation.

U501 employs reference frequency of 19.2MHz and shares the crystal with OMAP. The second LO VCO comprises an oscillator, a varactor and some other components, to provide the 71.1/75.6MHz LO signal. The 18MHz clock frequency is generated by the LC resonance loop.

11.3 Frequency Generation Unit (FGU)

The repeater has two FGUs. One is RX FGU providing the first LO frequency for the RX system; the

other is TX FGU providing carrier and exciter signal for the TX system. They work simultaneously, but are locked at different frequencies.

Both RX FGU and TX FGU mainly consist of a reference crystal oscillator, a PLL, a VCO and a buffer amplifier. The PLL data is configured via OMAP.

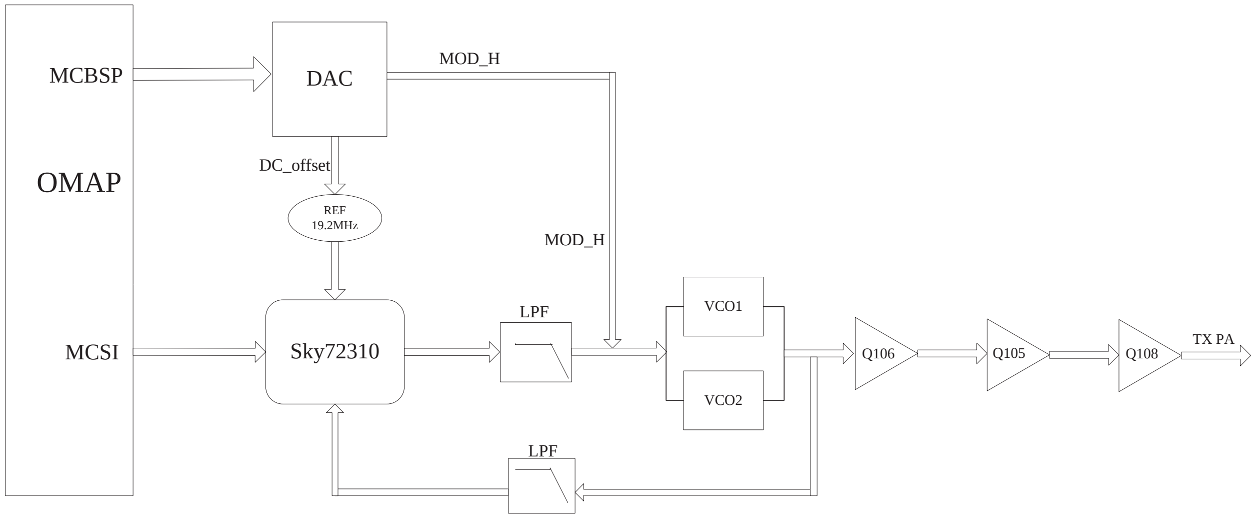


Figure 11-4 Block Diagram of Transmitter

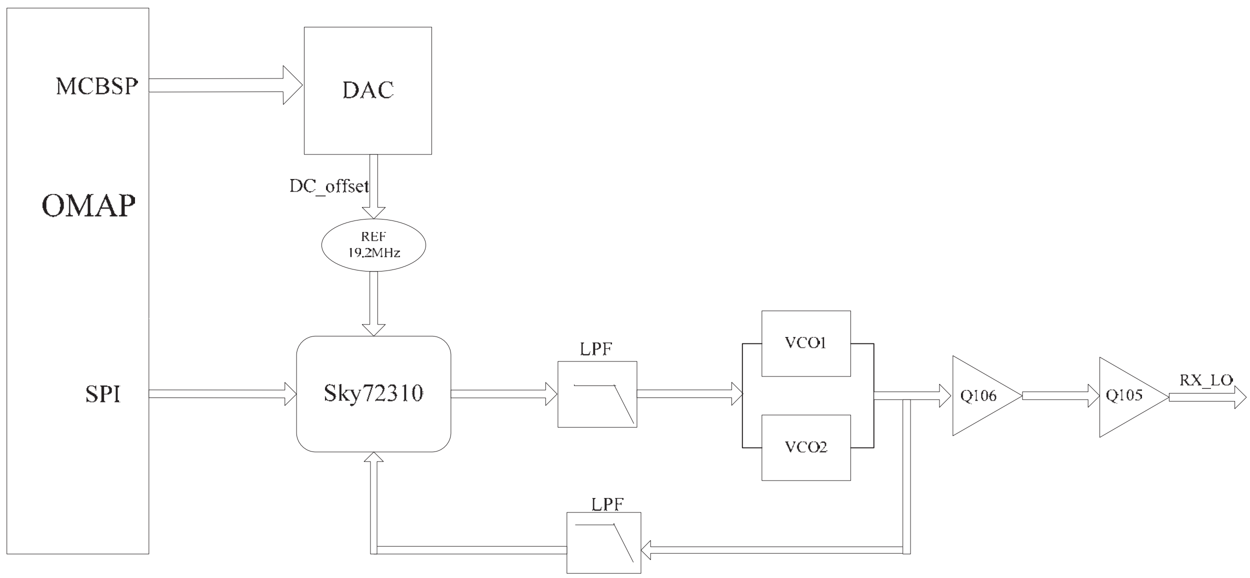


Figure 11-5 Block Diagram of Receiver

Reference Oscillator

The reference crystal oscillator is a temperature compensated crystal oscillator with a frequency of 19.2MHz. You can control the oscillator by adjusting the DC voltage output by the digital-to-analog converter, so as to ensure frequency accuracy.

PLL IC

The PLL is a fractional frequency divider (SKY72310), which consists of the pre-divider, programmable

divider, phase detector, charge pump and etc. The voltage of analog circuit and digital circuit of PLL IC is 3.3V voltage, while the voltage of charge pump is 5V. See the following figure:

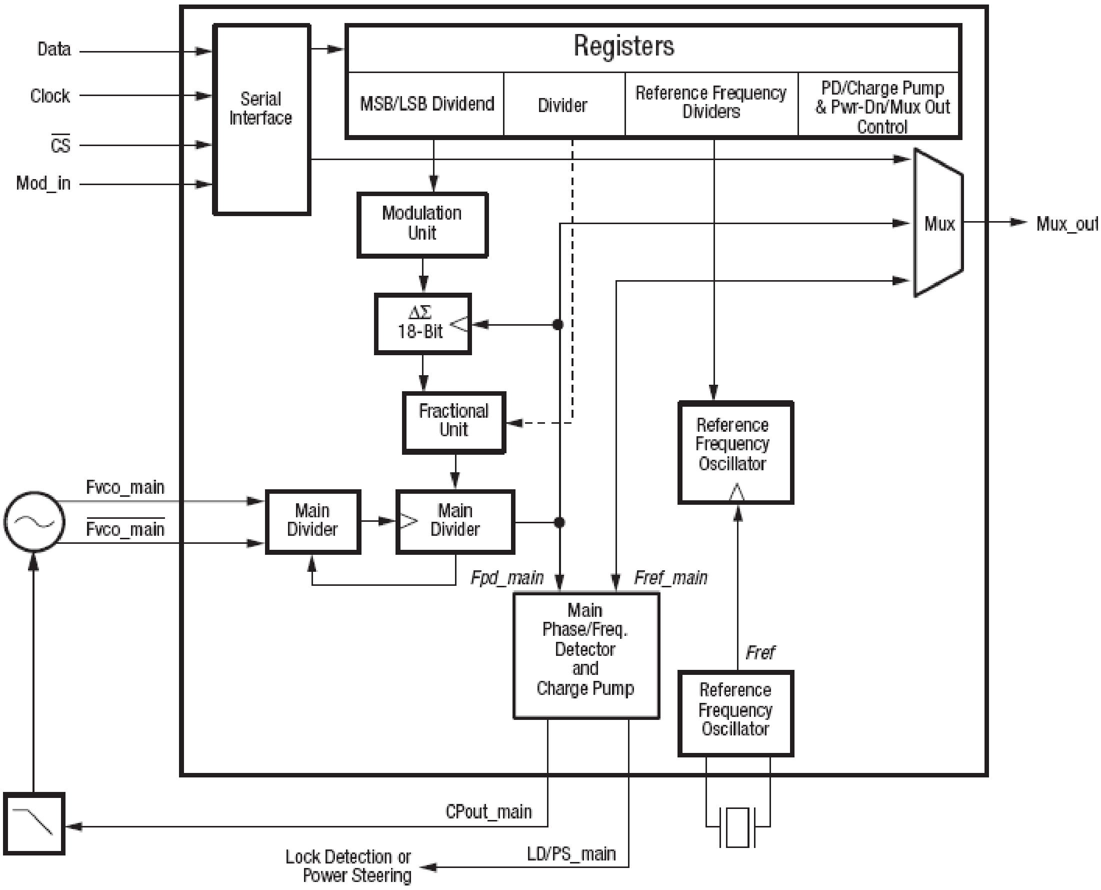


Figure 11-6 Block Diagram of PLL IC

SKY72310's role is to generate appropriate frequency based on the data transmitted by OMAP of baseband board. The 19.2MHz frequency generated by the reference crystal oscillator goes into the PLL, to generate the reference frequency. Meanwhile, the frequency generated by VCO goes into PLL for frequency division. The resulting frequency will be compared with reference frequency in terms of phase difference in the phase detector. After comparison, the resulting frequency is converted to CV voltage via the loop filter, to control the output frequency of VCO. In addition, as a key component of the modulation circuit, PLL can directly obtain data from the MCSI port of OMAP for modulation.

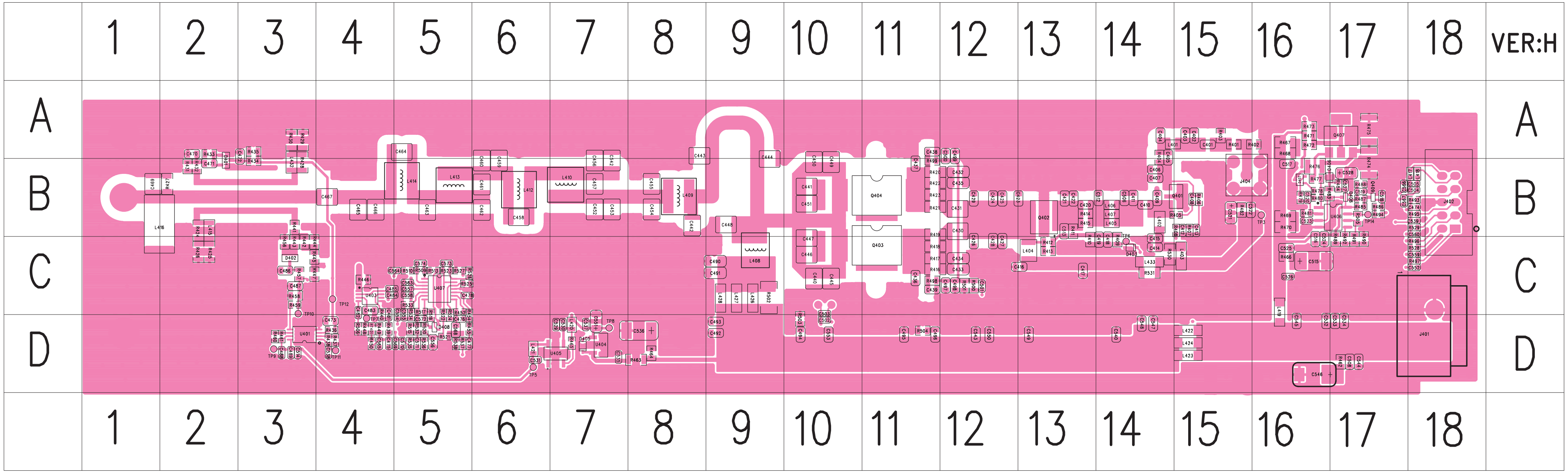
VCO

The VCO for RX unit comprises two transistors (Q101 and Q107), a varactor and four Colpitts oscillators. Q105 and Q106 are the buffer amplifiers for the RX unit.

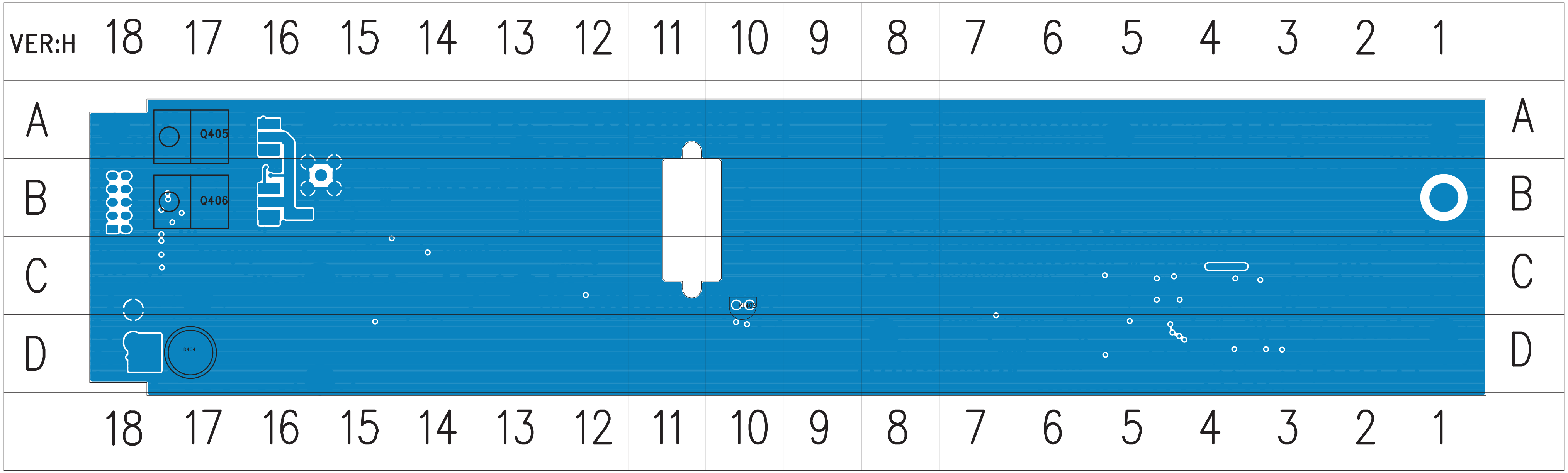
The VCO for exciter unit comprises two transistors (Q101 and Q107), a varactor and four Colpitts oscillators. Q105 and Q106 are the buffer amplifiers for the exciter unit.

11.4 PCB View

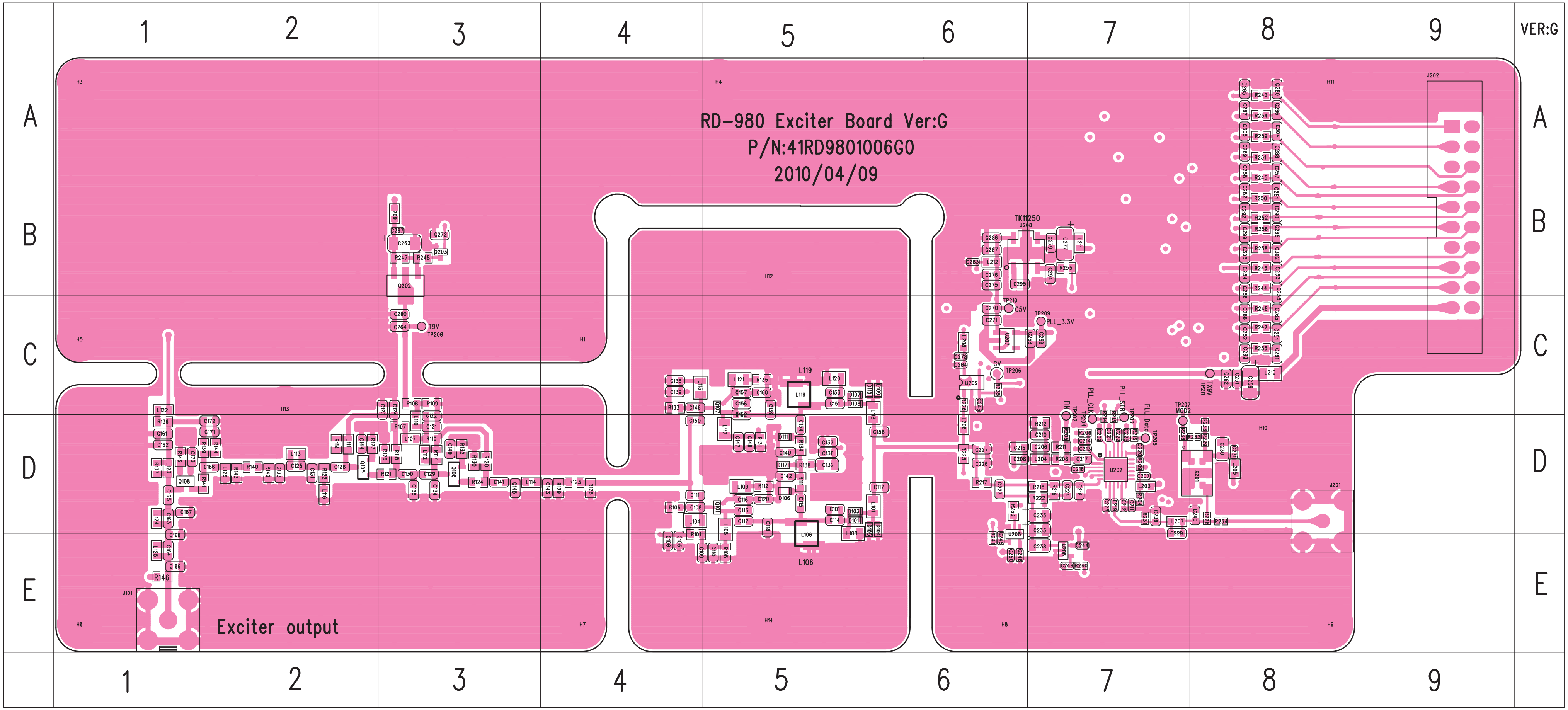
RD98X PCB View (PA Board)
Top Layer



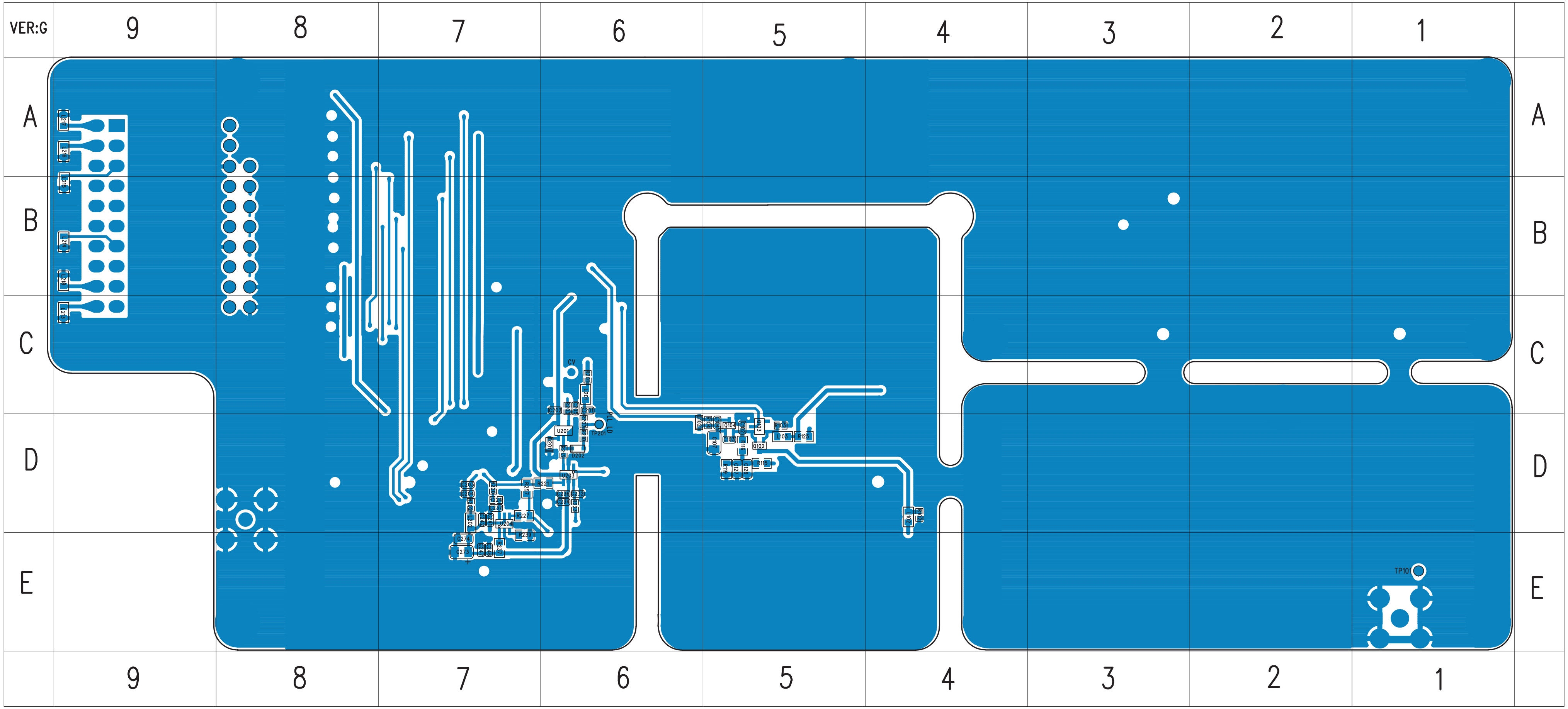
RD98X PCB View (PA Board)
Bottom Layer



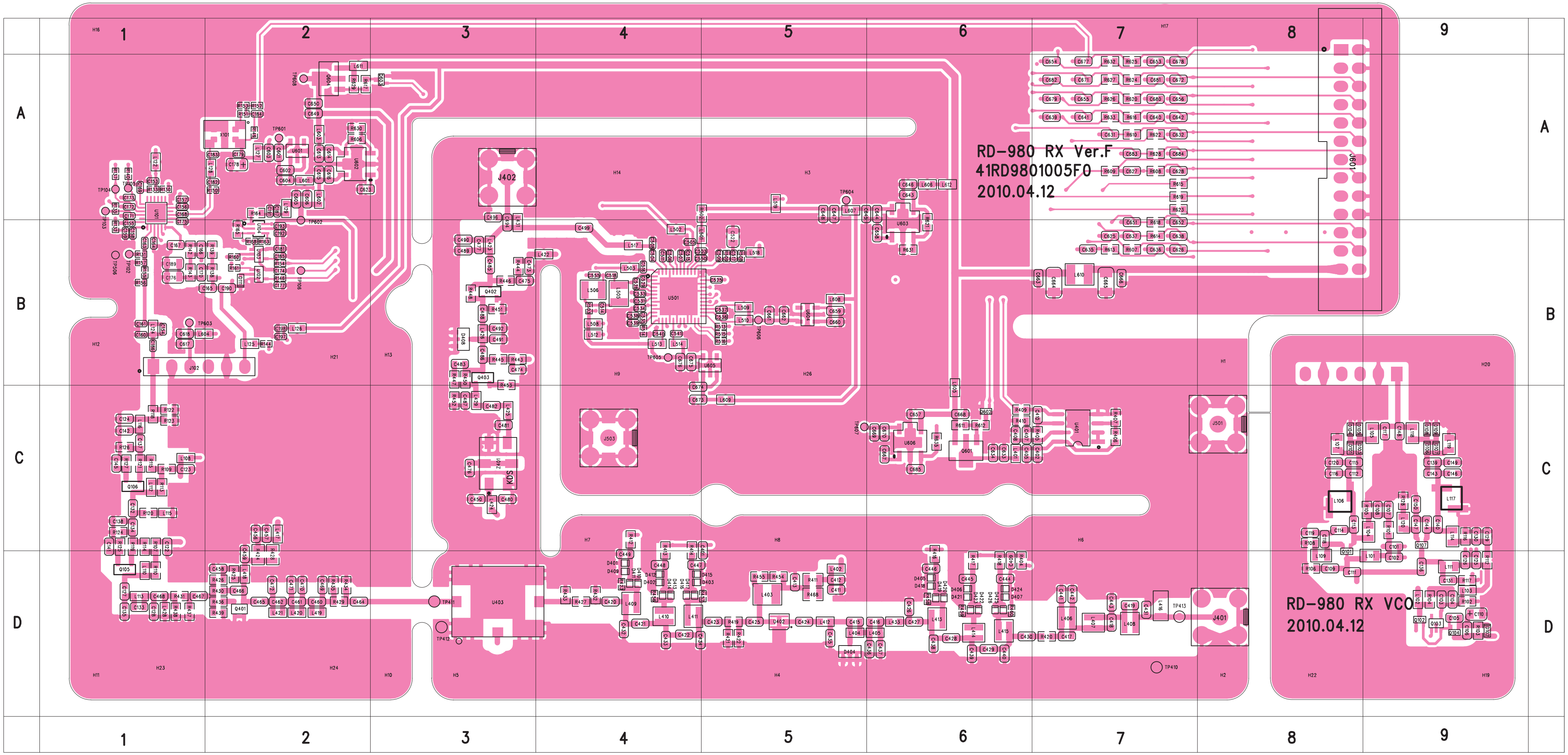
RD98X PCB View (Exciter Board)
Top Layer



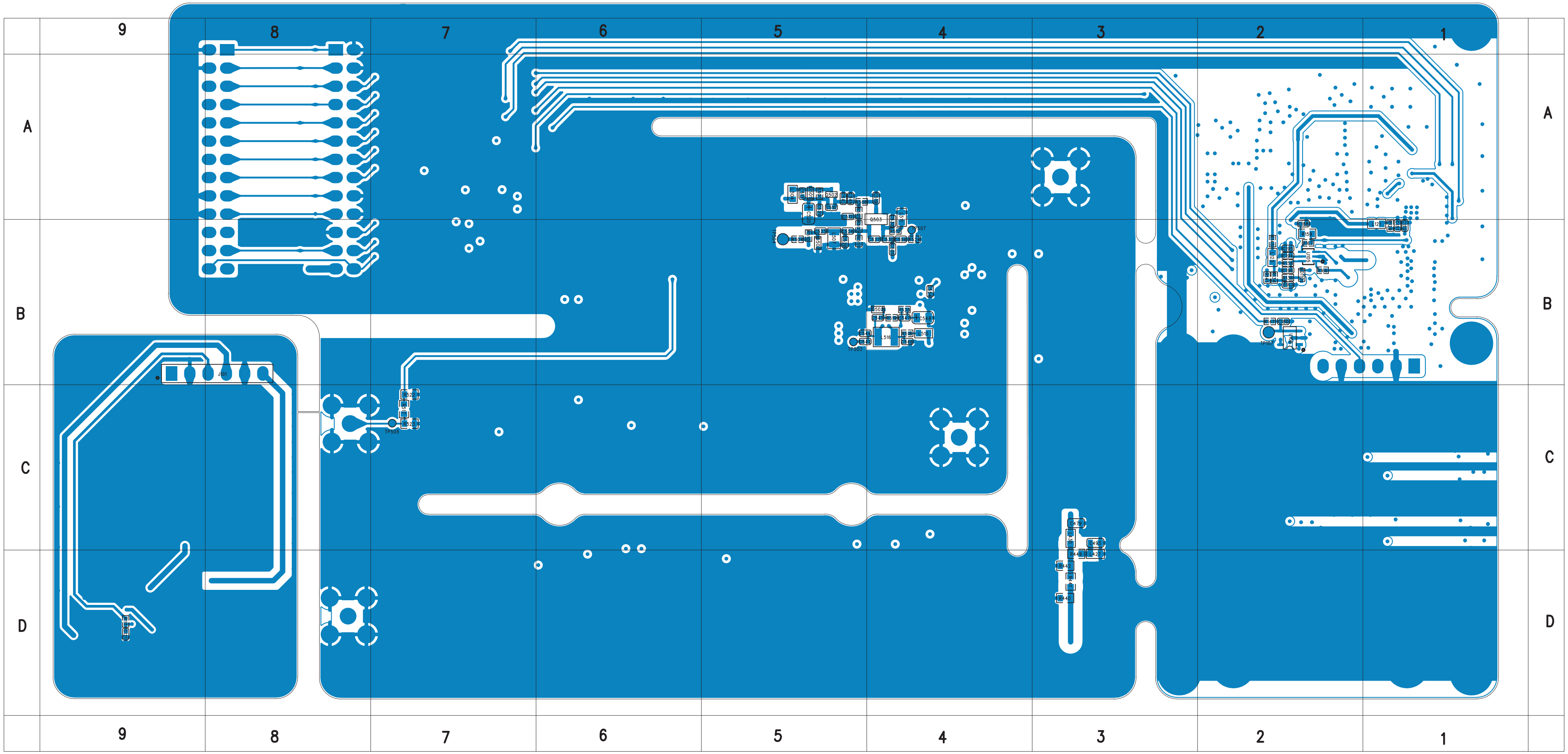
RD98X PCB View (Exciter Board)
Bottom Layer



RD98X PCB View (RX Board)
Top Layer

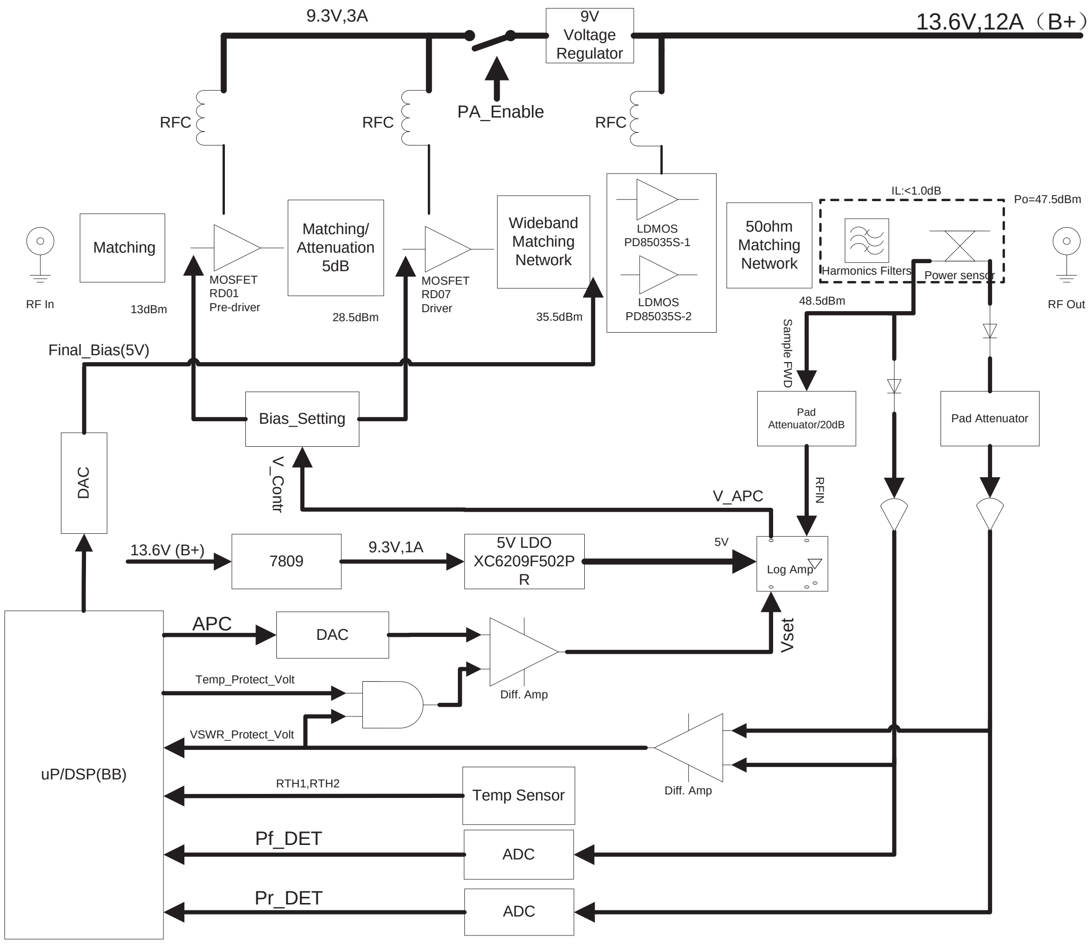


RD98X PCB View (RX Board)
Bottom Layer

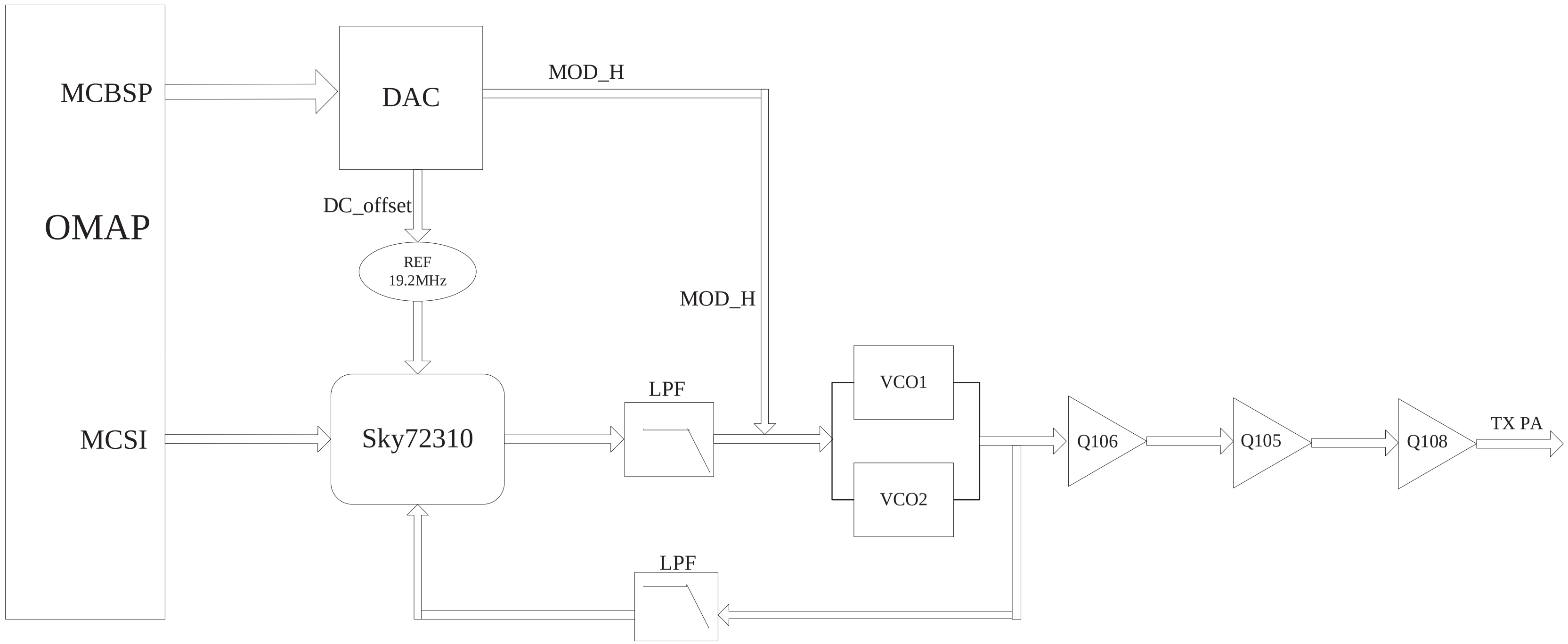


11.5 Block Diagram

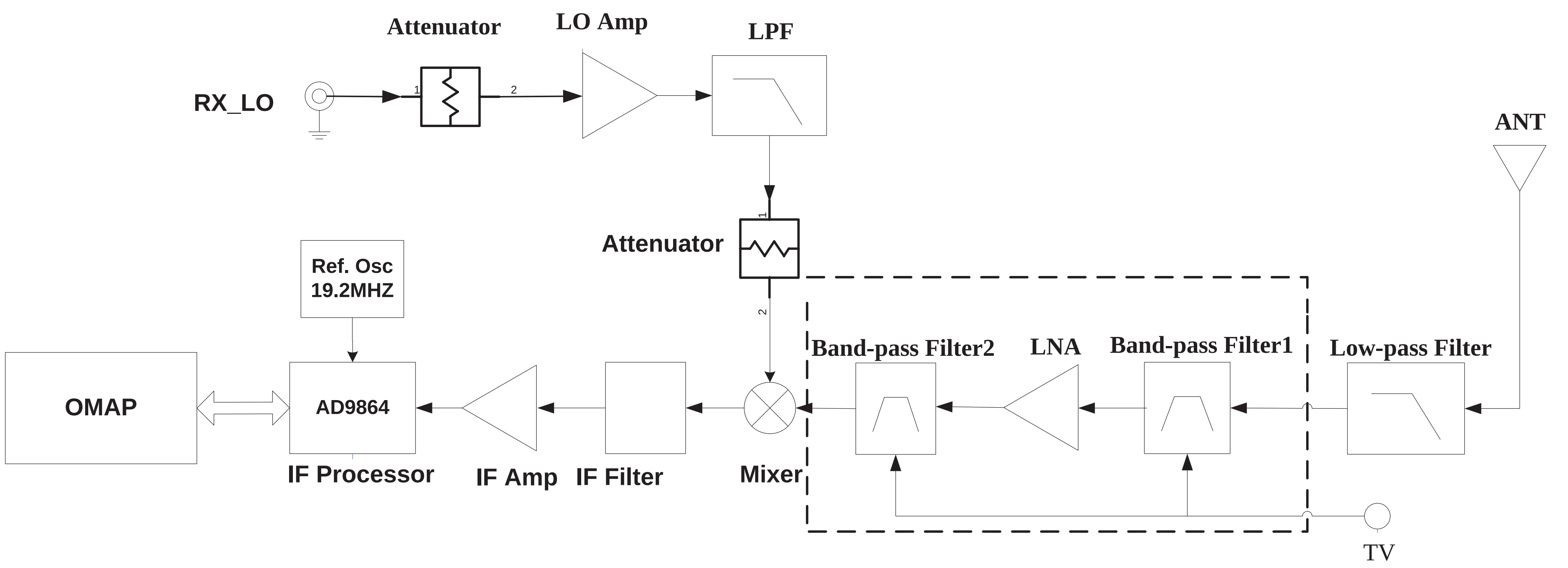
RD98X Block Diagram (PA Section)



RD98X Block Diagram (Exciter Section)

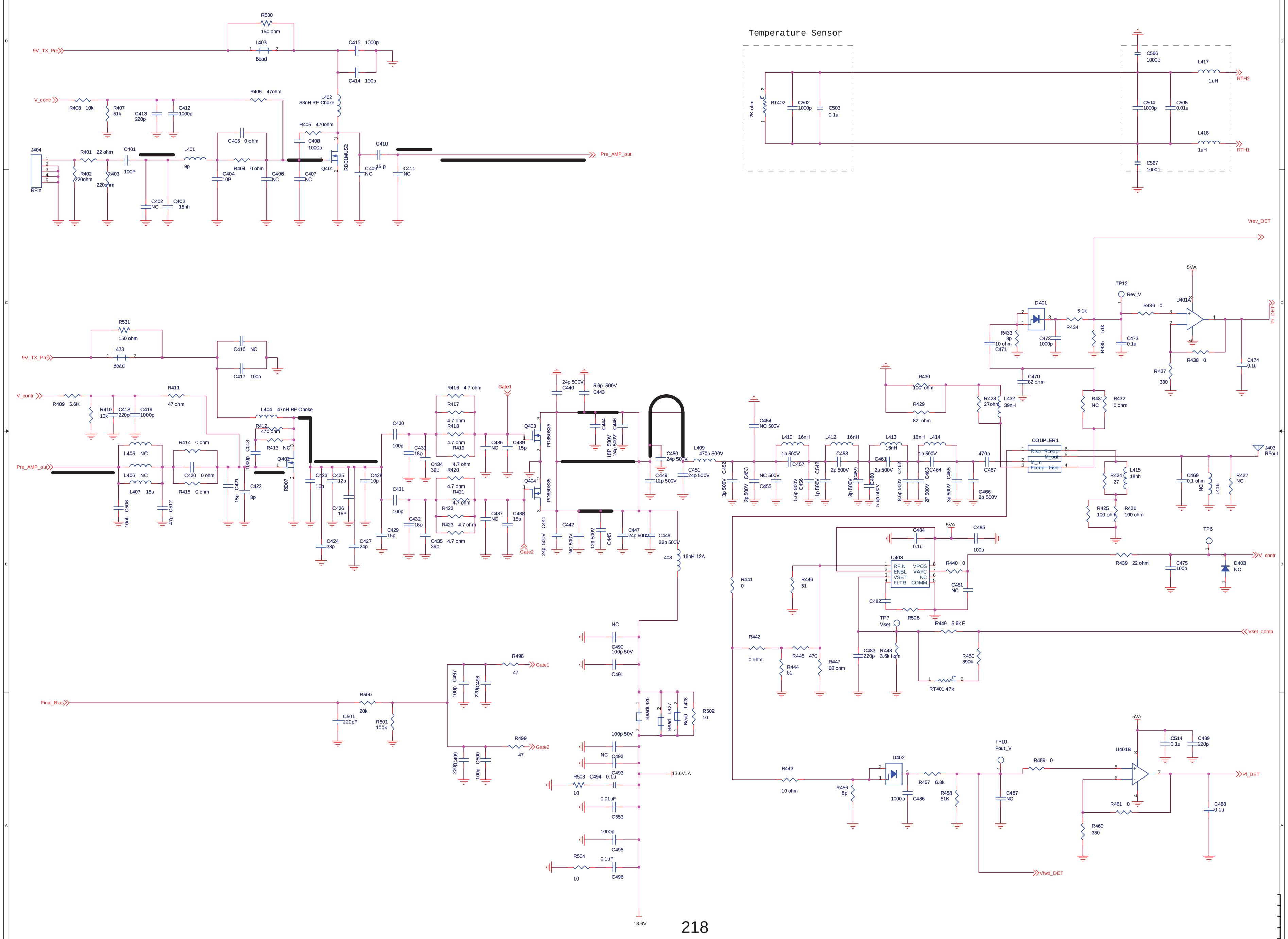


RD98X Block Diagram (RX Section)

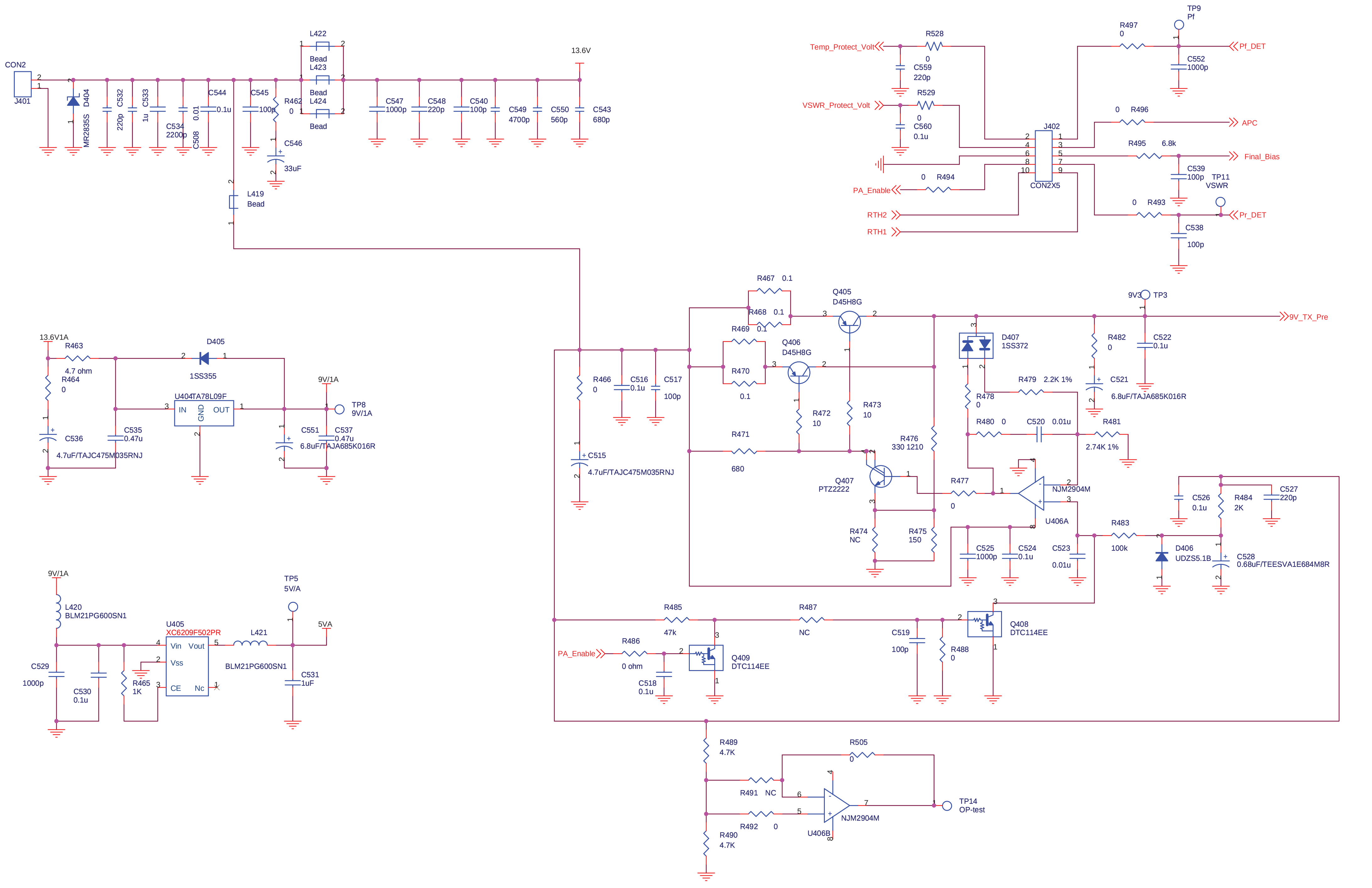


11.6 Schematic Diagram

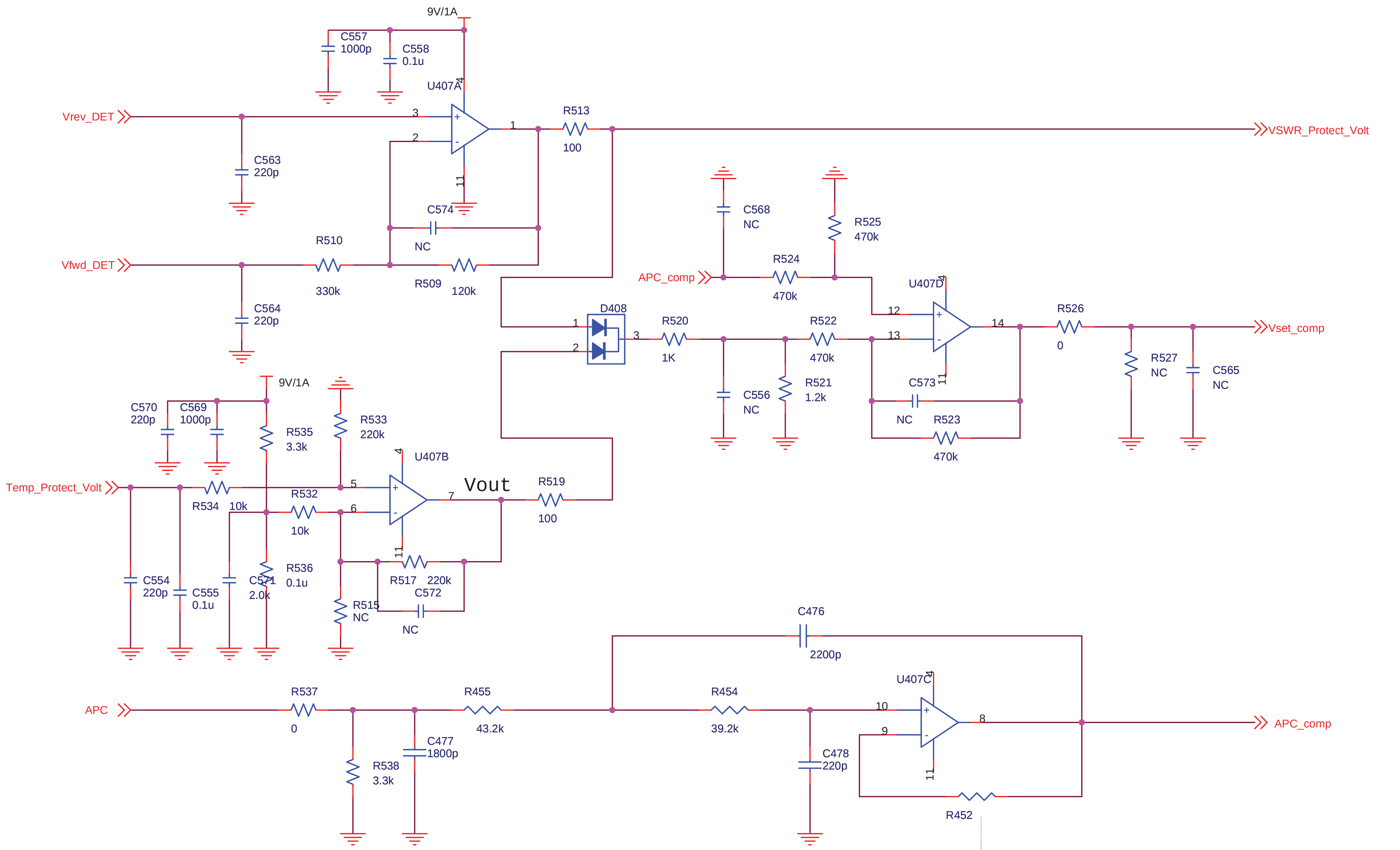
RD98X Schematic Diagram (PA Circuit)



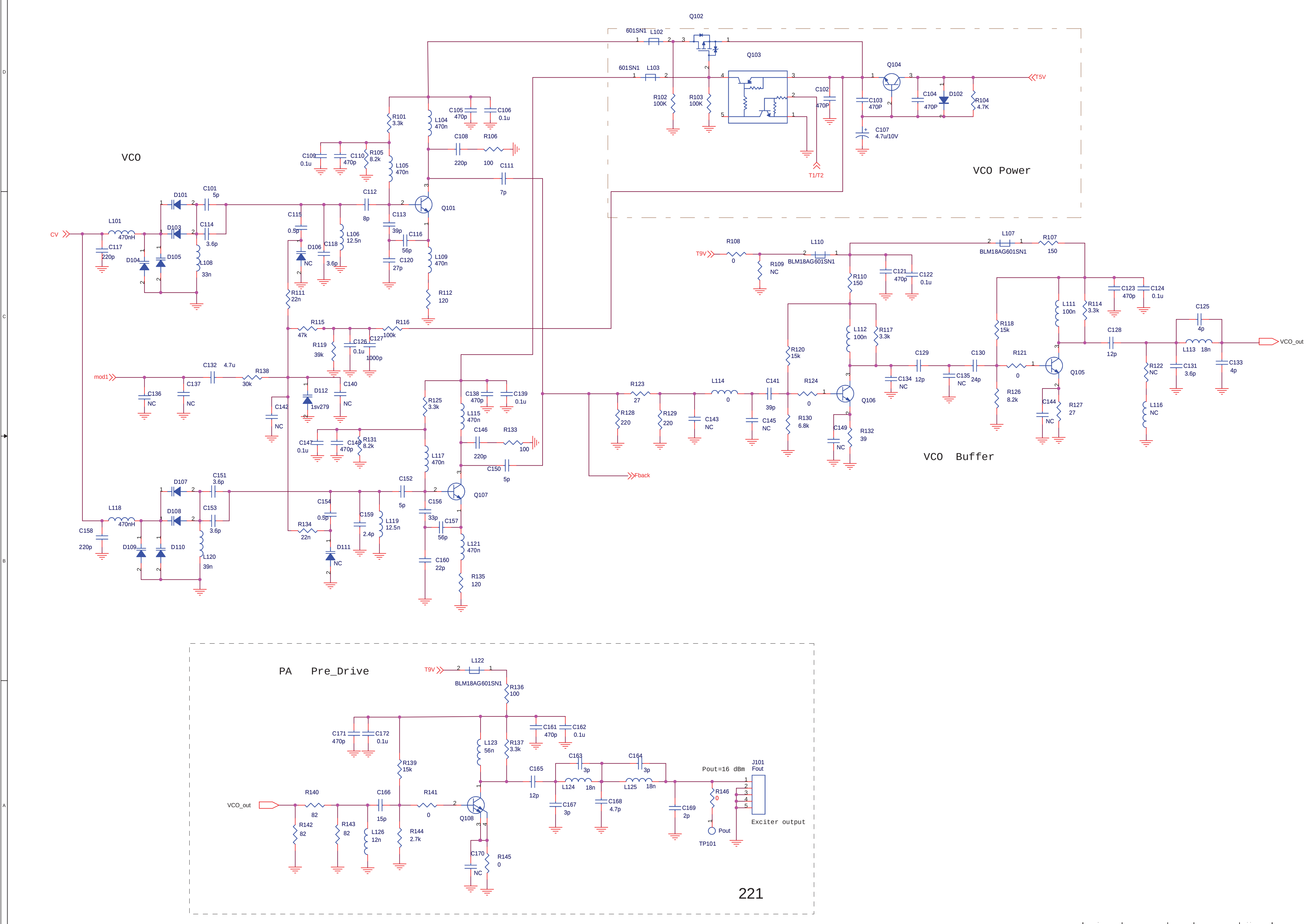
RD98X Schematic Diagram (TX_Power Supply Circuit)



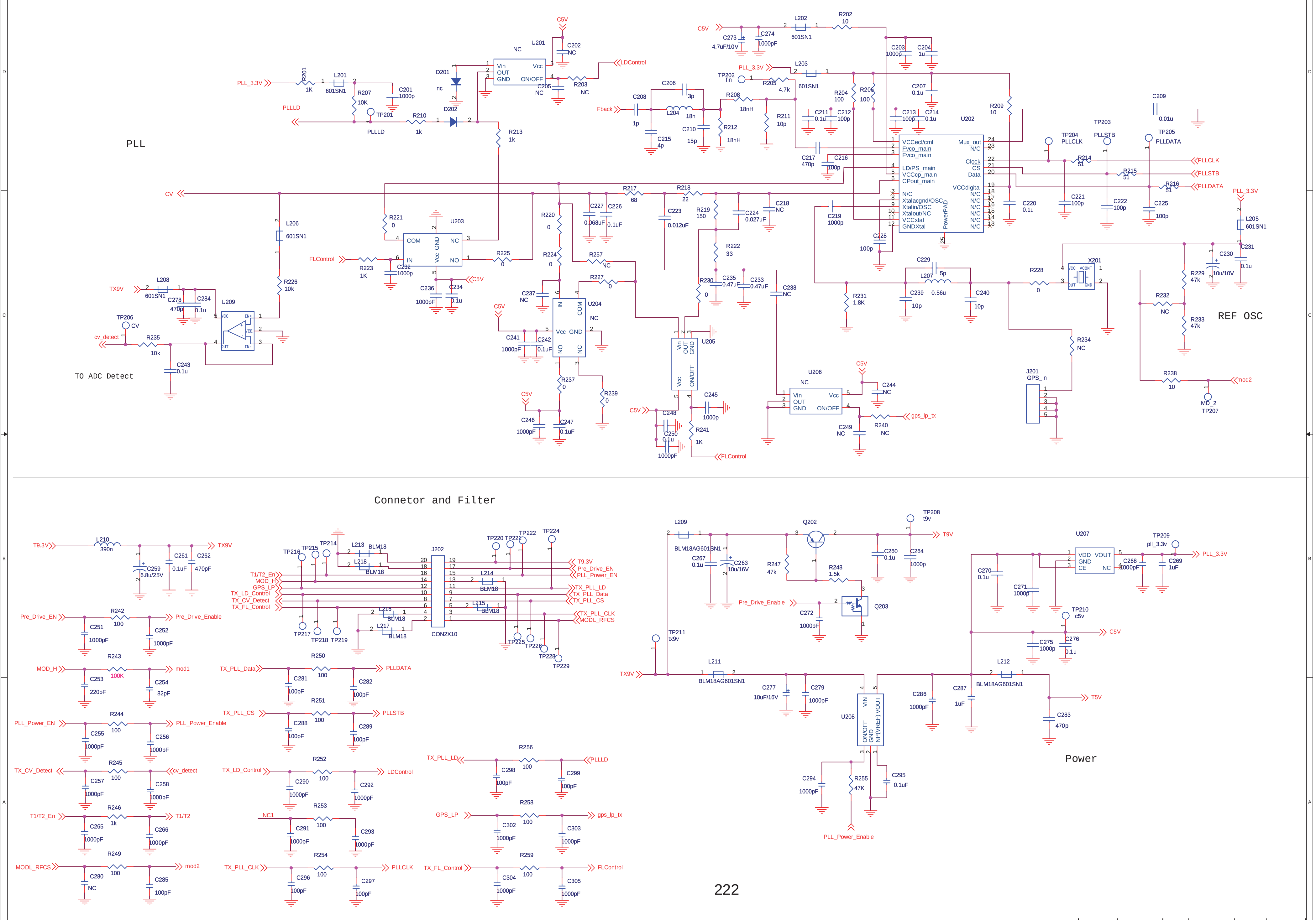
RD98X Schematic Diagram (TX_VSWR & Temperature Protection Circuit)



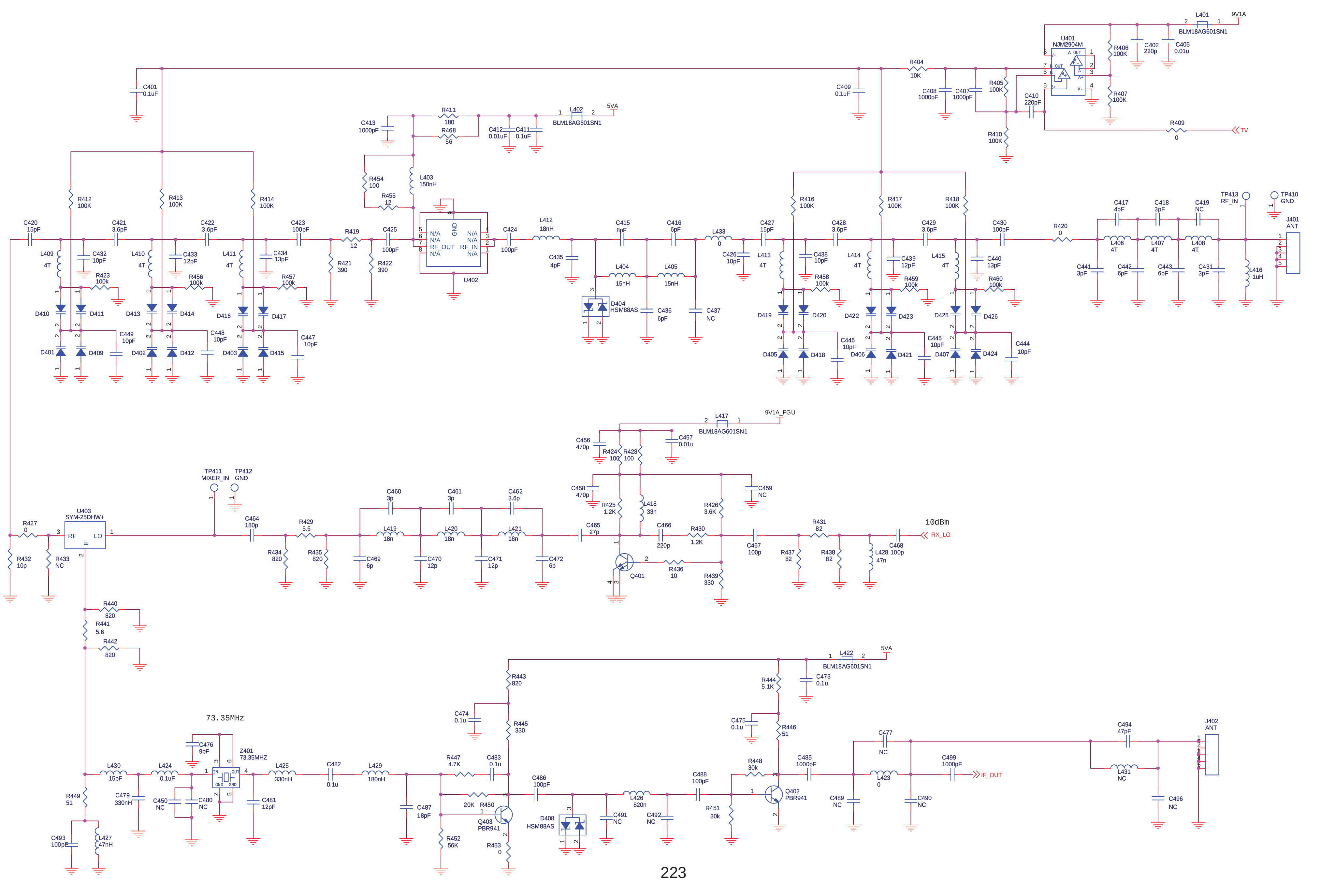
RD98X Schematic Diagram (Exciter_VCO/Buffer/Pre_Driver Circuit)



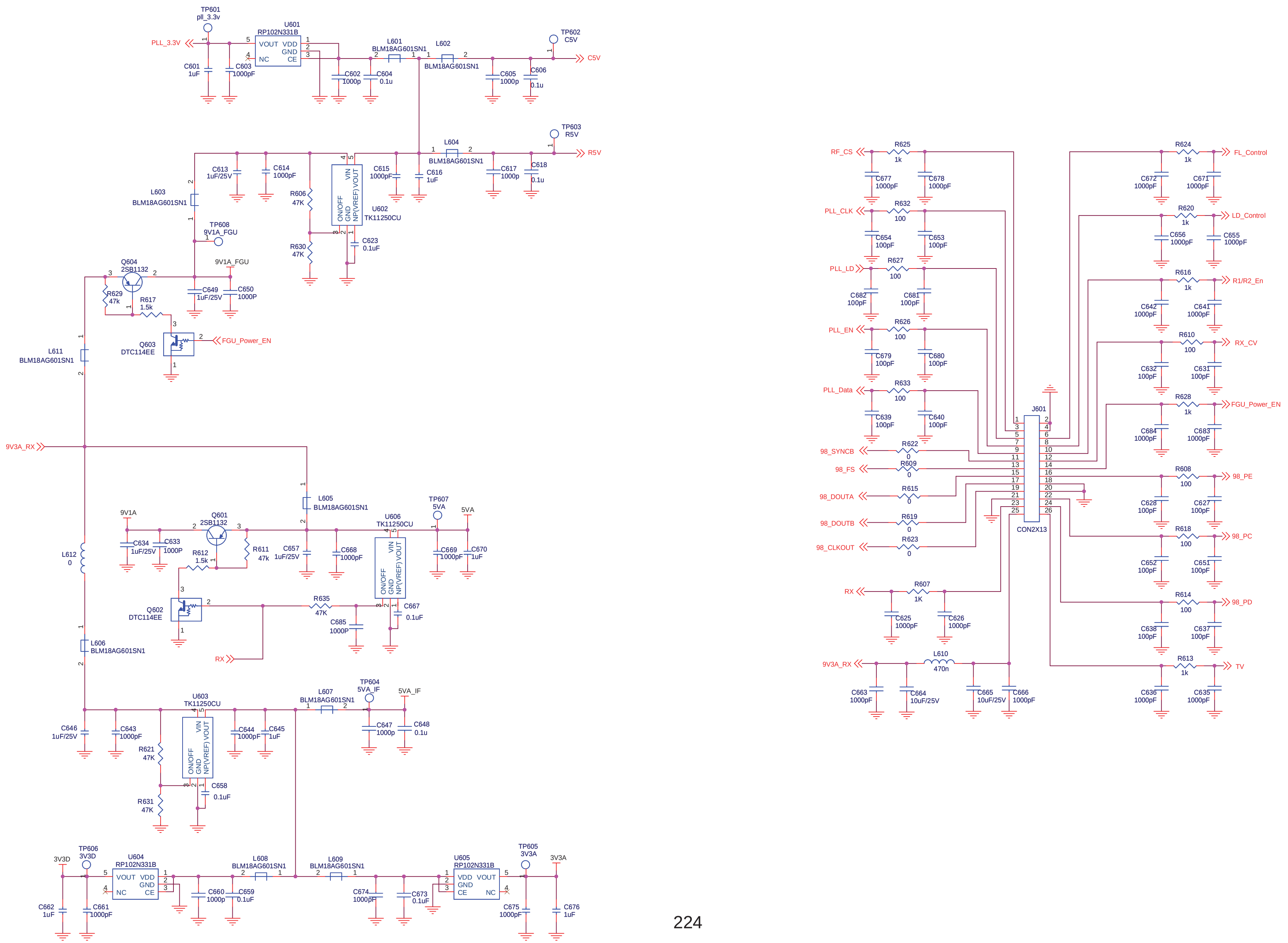
RD98X Schematic Diagram (Exciter_PLL/Power Supply/Connector Circuit)



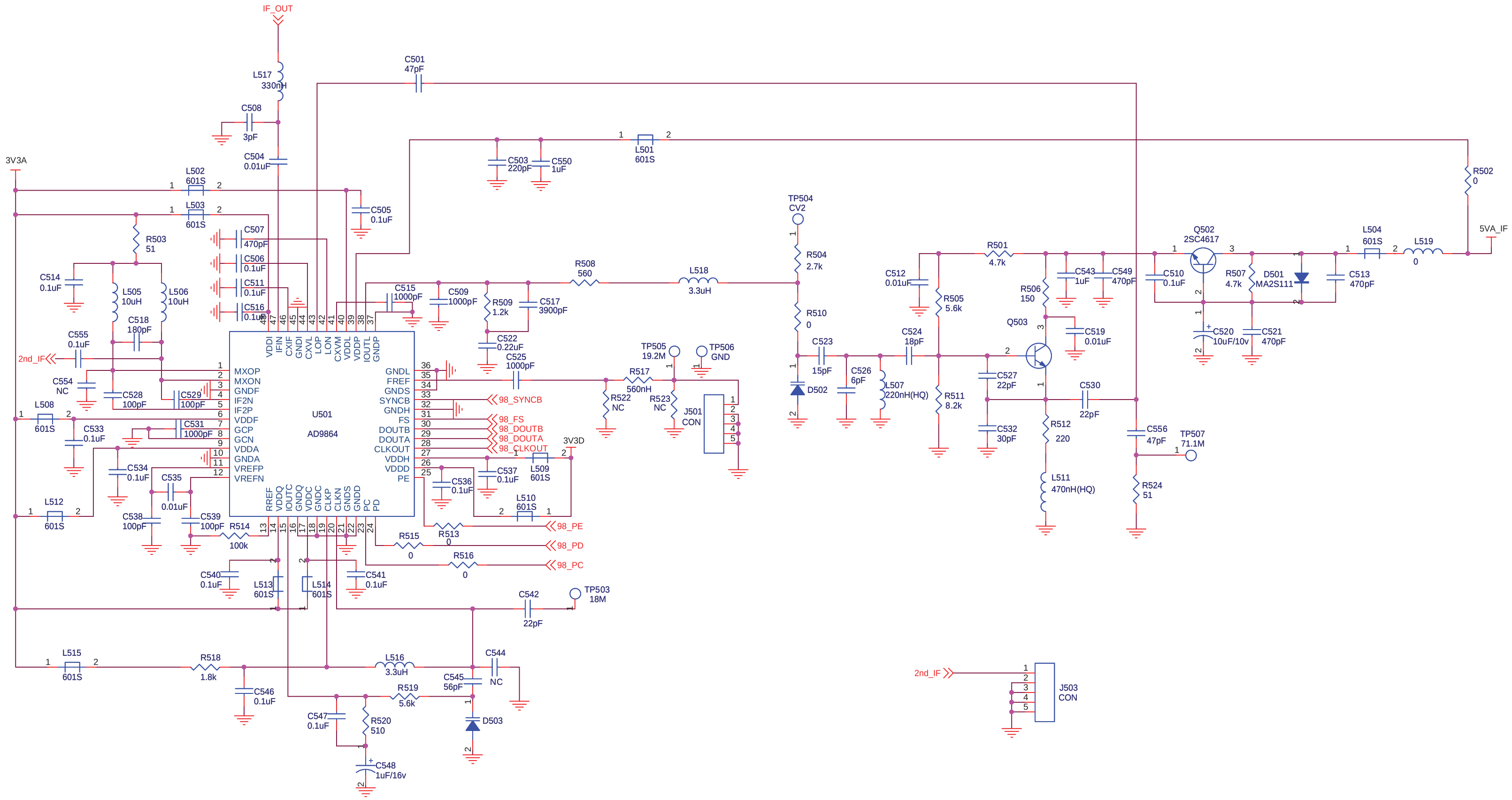
RD98X Schematic Diagram (RX_Front-end Circuit)



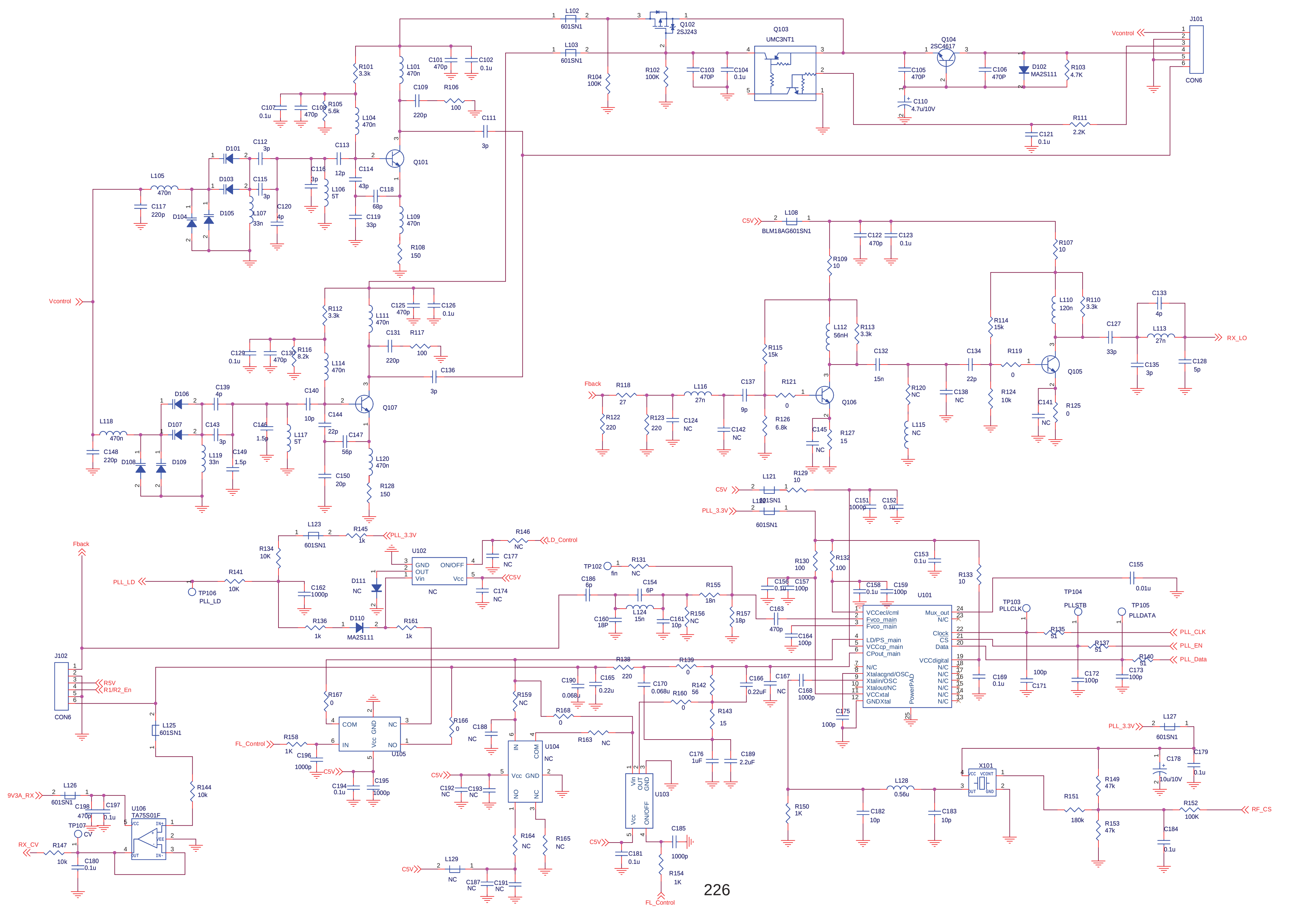
RD98X Schematic Diagram (RX_Power Supply Circuit)



RD98X Schematic Diagram (RX_AD9864 Circuit)



RD98X Schematic Diagram (RX_Frequency Synthesizer Circuit)



11.7 Parts List

Power Amplifier

No.	Ref. No.	Part No.	Description
1	C401	3101071010000	100PF
2	C414	3101071010000	100PF
3	C417	3101071010000	100PF
4	C492	3101071010000	100PF
5	C497	3101071010000	100PF
6	C500	3101071010000	100PF
7	C517	3101071010000	100PF
8	C540	3101071010000	100PF
9	C545	3101071010000	100PF
10	C403	3212106180000	18nH
11	C422	3101070800010	8PF
12	R433	3101070800010	8PF
13	R456	3101070800010	8PF
14	C512	3101074700000	47PF
15	C413	3101062210000	220PF
16	C478	3101062210000	220PF
17	C489	3101062210000	220PF
18	C501	3101062210000	220PF
19	C527	3101062210000	220PF
20	C554	3101062210000	220PF
21	C559	3101062210000	220PF
22	C563	3101062210000	220PF
23	C564	3101062210000	220PF
24	C570	3101062210000	220PF
25	C415	3101071020010	1000PF
26	C419	3101071020010	1000PF
27	C472	3101071020010	1000PF
28	C486	3101071020010	1000PF
29	C495	3101071020010	1000PF
30	C513	3101071020010	1000PF
31	C525	3101071020010	1000PF
32	C547	3101071020010	1000PF
33	C418	3101072210010	220PF
34	C483	3101072210010	220PF
35	C498	3101072210010	220PF
36	C499	3101072210010	220PF
37	C532	3101072210010	220PF
38	C548	3101072210010	220PF
39	C425	3101071200000	12PF

No.	Ref. No.	Part No.	Description
40	C424	3101073300000	33PF
41	C410	3101071500000	15PF
42	C421	3101071500000	15PF
43	C426	3101071500000	15PF
44	C429	3101071500000	15PF
45	C438	3101071500000	15PF
46	C439	3101071500000	15PF
47	C427	3101072400000	24PF
48	C430	3101371010000	100pF
49	C431	3101371010000	100pF
50	C432	3101081800010	18pF
51	C433	3101081800010	18pF
52	C434	3101083900010	39pF
53	C435	3101083900010	39pF
54	C445	3101371200000	12pF
55	C449	3101371200000	12pF
56	C443	3101375690000	5.6pF
57	C456	3101375690000	5.6pF
58	C460	3101375690000	5.6pF
59	C448	3101372200000	22pF
60	C440	3101372400000	24pF
61	C441	3101372400000	24pF
62	C446	3101372400000	24pF
63	C447	3101372400000	24pF
64	C450	3101372400000	24pF
65	C451	3101372400000	24pF
66	C453	3101370200000	2pF
67	C458	3101370200000	2pF
68	C461	3101370200000	2pF
69	C463	3101370200000	2pF
70	C466	3101370200000	2pF
71	C462	3101378290000	8.2pF
72	C457	3101370100000	1pF
73	C464	3101370100000	1pF
74	C542	3101370100000	1pF
75	C452	3101370300000	3pF
76	C459	3101370300000	3pF
77	C465	3101370300000	3pF
78	C467	3101374710000	470pF
79	L409	3101374710000	470pF
80	C473	3101071040000	0.1UF
81	C494	3101071040000	0.2UF

No.	Ref. No.	Part No.	Description
82	C496	3101071040000	0.3UF
83	C516	3101071040000	0.4UF
84	C522	3101071040000	0.5UF
85	C524	3101071040000	0.6UF
86	C544	3101071040000	0.7UF
87	C474	3101061040010	0.1UF
88	C484	3101061040010	0.1UF
89	C488	3101061040010	0.1UF
90	C503	3101061040010	0.1UF
91	C514	3101061040010	0.1UF
92	C518	3101061040010	0.1UF
93	C526	3101061040010	0.1UF
94	C530	3101061040010	0.1UF
95	C555	3101061040010	0.1UF
96	C558	3101061040010	0.1UF
97	C560	3101061040010	0.1UF
98	C571	3101061040010	0.1UF
99	C475	3101061010010	100PF
100	C485	3101061010010	100PF
101	C519	3101061010010	100PF
102	C538	3101061010010	100PF
103	C539	3101061010010	100PF
104	C565	3101061010010	100PF
105	C476	3101062220010	2200PF
106	C408	3101061020000	1000PF
107	C412	3101061020000	1000PF
108	C477	3101061020000	1000PF
109	C502	3101061020000	1000PF
110	C504	3101061020000	1000PF
111	C529	3101061020000	1000PF
112	C552	3101061020000	1000PF
113	C557	3101061020000	1000PF
114	C566	3101061020000	1000PF
115	C567	3101061020000	1000PF
116	C569	3101061020000	1000PF
117	C491	3101081040010	0.1UF
118	C505	3101061030010	0.01UF
119	C520	3101061030010	0.01UF
120	C523	3101061030010	0.01UF
121	C506	3212106100000	10nH
122	C508	3101071030010	0.01UF
123	C553	3101071030010	0.01UF

No.	Ref. No.	Part No.	Description
124	C515	3104994750020	4.7uF
125	C536	3104994750020	4.7uF
126	C521	3104086850030	6.8UF
127	C551	3104086850030	6.8UF
128	C528	3104086840020	0.68UF
129	C531	3101061050000	1UF
130	C533	3101071050160	1UF
131	C534	3101072220010	2200PF
132	C535	3101064740000	0.47UF
133	C537	3101064740000	0.47UF
134	C546	3104993360000	33uF
135	C482	3101064720000	4700PF
136	D401	3609030000000	Schottky diode
137	D402	3609030000000	Schottky diode
138	D405	3303010500040	Switching diode
139	D406	3302030500030	Zener diode
140	D407	3303010500290	Switching diode
141	D408	3303030100010	Switching diode
142	L402	3231351660000	33nH
143	L415	3217112180000	18nH
144	L432	3213212390000	39nH
145	L403	3221513600000	Ferrite bead
146	L419	3221513600000	Ferrite bead
147	L422	3221513600000	Ferrite bead
148	L423	3221513600000	Ferrite bead
149	L424	3221513600000	Ferrite bead
150	L426	3221513600000	Ferrite bead
151	L427	3221513600000	Ferrite bead
152	L428	3221513600000	Ferrite bead
153	L433	3221513600000	Ferrite bead
154	L404	3231351680000	47nH
155	L407	3101071800000	18PF
156	L408	3231803050000	16nH
157	L410	3233099160000	16nH
158	L412	3233099160000	16nH
159	L413	3233099160000	16nH
160	L414	3233099160000	16nH
161	L417	3213306102000	1uH
162	L418	3213306102000	1uH
163	L420	3221507600000	Ferrite bead
164	L421	3221507600000	Ferrite bead
165	Q401	3504990000010	PA MOSFET

No.	Ref. No.	Part No.	Description
166	Q402	3504990000020	PA MOSFET
167	Q408	3403008000010	Bias resistor transistor
168	Q409	3403008000010	Bias resistor transistor
169	R455	3001064730000	47KΩ
170	R485	3001064730000	47KΩ
171	RT401	3001064730000	47KΩ
172	R535	3001063320000	3.3KΩ
173	R538	3001063320000	3.3KΩ
174	R401	3001072200000	22Ω
175	R402	3001072210000	220Ω
176	R403	3001072210000	220Ω
177	R513	3001061010000	100Ω
178	R519	3001061010000	100Ω
179	R406	3001064700000	47Ω
180	R407	3001065130000	51KΩ
181	R435	3001065130000	51KΩ
182	R458	3001065130000	51KΩ
183	R408	3001061030000	10KΩ
184	R506	3001061030000	10KΩ
185	R532	3001061030000	10KΩ
186	R534	3001061030000	10KΩ
187	R517	3001062240000	220KΩ
188	R533	3001062240000	220KΩ
189	R409	3001065620010	5.6KΩ
190	R449	3001065620010	5.6KΩ
191	R410	3001071030000	10KΩ
192	R416	3001084790000	4.7Ω
193	R417	3001084790000	4.7Ω
194	R418	3001084790000	4.7Ω
195	R419	3001084790000	4.7Ω
196	R420	3001084790000	4.7Ω
197	R421	3001084790000	4.7Ω
198	R422	3001084790000	4.7Ω
199	R423	3001084790000	4.7Ω
200	R463	3001084790000	4.7Ω
201	R424	3001082700000	27Ω
202	R428	3001082700000	27Ω
203	R429	3001088200010	82Ω
204	R425	3001081010000	100Ω
205	R426	3001081010000	100Ω
206	R430	3001081010000	100Ω
207	R444	3001075100000	51Ω

No.	Ref. No.	Part No.	Description
208	R446	3001075100000	51Ω
209	C471	3001071000000	10Ω
210	R443	3001071000000	10Ω
211	R472	3001071000000	10Ω
212	R473	3001071000000	10Ω
213	R503	3001071000000	10Ω
214	R504	3001071000000	10Ω
215	R437	3001063310010	330Ω
216	R460	3001063310010	330Ω
217	R436	3001060000000	0Ω
218	R438	3001060000000	0Ω
219	R440	3001060000000	0Ω
220	R452	3001060000000	0Ω
221	R459	3001060000000	0Ω
222	R461	3001060000000	0Ω
223	R478	3001060000000	0Ω
224	R480	3001060000000	0Ω
225	R486	3001060000000	0Ω
226	R487	3001060000000	0Ω
227	R496	3001060000000	0Ω
228	R526	3001060000000	0Ω
229	R537	3001060000000	0Ω
230	R493	3210306560000	56nH
231	R494	3210306560000	56nH
232	R495	3210306560000	56nH
233	R497	3210306560000	56nH
234	R528	3210306560000	56nH
235	R529	3210306560000	56nH
236	R439	3001062200000	22Ω
237	C405	3001070000000	0Ω
238	C420	3001070000000	0Ω
239	R404	3001070000000	0Ω
240	R414	3001070000000	0Ω
241	R415	3001070000000	0Ω
242	R432	3001070000000	0Ω
243	R441	3001070000000	0Ω
244	R442	3001070000000	0Ω
245	R462	3001070000000	0Ω
246	R464	3001070000000	0Ω
247	R466	3001070000000	0Ω
248	R477	3001070000000	0Ω
249	R482	3001070000000	0Ω

No.	Ref. No.	Part No.	Description
250	R492	3001070000000	0Ω
251	R505	3001070000000	0Ω
252	R448	3001063620000	3.6KΩ
253	R454	3001063930000	39KΩ
254	C470	3001078200000	82Ω
255	R465	3001061020000	1KΩ
256	R520	3001061020000	1KΩ
257	R521	3001061020000	1KΩ
258	R467	3001080190000	0.1Ω
259	R468	3001080190000	0.1Ω
260	R469	3001080190000	0.1Ω
261	R470	3001080190000	0.1Ω
262	R471	3001076810000	680Ω
263	R475	3001161510010	150Ω
264	R476	3001083310010	330Ω
265	R479	3001062220000	2.2KΩ
266	R481	3001062720030	2.7KΩ
267	R483	3001071040010	100KΩ
268	R501	3001071040010	100KΩ
269	R484	3001062020030	2KΩ
270	R536	3001062020030	2KΩ
271	R489	3001074720010	4.7KΩ
272	R490	3001074720010	4.7KΩ
273	R500	3001072030000	20KΩ
274	R502	3001161000010	10Ω
275	R522	3001061840000	180KΩ
276	R523	3001061840000	180KΩ
277	R524	3001061840000	180KΩ
278	R525	3001061840000	180KΩ
279	U401	3605008005070	Operational amplifier
280	U403	3623025000000	Wave detector IC
281	U404	3608002005490	Power management IC
282	U405	3608015000060	Power management IC
283	U406	3605008001690	Operational amplifier
284	U407	3605010000020	Operational amplifier
285	R530	3001081510020	150Ω
286	R531	3001081510020	150Ω
287	E1	6201868000000	Heat sink
288			PCB
289	E3	6202011000000	Shielding mask
290	R445	3001074710010	470Ω
291	D404	3302060000000	Zener diode

No.	Ref. No.	Part No.	Description
292	R434	3001075120000	5.1KΩ
293	L401	3101070900010	9pF
294	C404	3101071000020	10pF
295	C423	3101071000020	10pF
296	C428	3101071000020	10pF
297	R457	3001066820000	6.8KΩ
298	C549	3101074720030	4700pF
299	C550	3101075610010	560pF
300	C543	3101076810000	680pF
301	R509	3001061240000	120KΩ
302	Q407	3404999000020	NPN transistor
303	R411	3001074700000	47Ω
304	R498	3001074700000	47Ω
305	R499	3001074700000	47Ω
306	R510	3001063340000	330KΩ
307	C490	3101081020010	1000pF
308	R412	3001074710000	470Ω
309	R405	3001064710000	470Ω
310	R450	3001063940010	390KΩ
311	C444	3101371800000	18pF
312	R447	3001076800000	68Ω

Exciter Board

No.	Ref. No.	Part No.	Description
1	R220	3001050000000	0Ω
2	R224	3001050000000	0Ω
3	R228	3001050000000	0Ω
4	L114	3001060000000	0Ω
5	R108	3001060000000	0Ω
6	R121	3001060000000	0Ω
7	R124	3001060000000	0Ω
8	R141	3001060000000	0Ω
9	R145	3001060000000	0Ω
10	R146	3001060000000	0Ω
11	R221	3001060000000	0Ω
12	R225	3001060000000	0Ω
13	R227	3001060000000	0Ω
14	R230	3001060000000	0Ω
15	R237	3001060000000	0Ω
16	R239	3001060000000	0Ω
17	R202	3001051000000	10Ω
18	R209	3001051000000	10Ω
19	R238	3001051000000	10Ω
20	R218	3001062200000	22Ω
21	R123	3001062700000	27Ω
22	R127	3001062700000	27Ω
23	R222	3001063300000	33Ω
24	R132	3001063900000	39Ω
25	R214	3001055100020	51Ω
26	R215	3001055100020	51Ω
27	R216	3001055100020	51Ω
28	R217	3001066800000	68Ω
29	R140	3001068200000	82Ω
30	R142	3001068200000	82Ω
31	R143	3001068200000	82Ω
32	R204	3001051010000	100Ω
33	R206	3001051010000	100Ω
34	R106	3001061010000	100Ω
35	R133	3001061010000	100Ω
36	R136	3001061010000	100Ω
37	R242	3001061010000	100Ω
38	R244	3001061010000	100Ω
39	R245	3001061010000	100Ω
40	R249	3001061010000	100Ω
41	R250	3001061010000	100Ω

No.	Ref. No.	Part No.	Description
42	R251	3001061010000	100Ω
43	R252	3001061010000	100Ω
44	R253	3001061010000	100Ω
45	R254	3001061010000	100Ω
46	R256	3001061010000	100Ω
47	R258	3001061010000	100Ω
48	R259	3001061010000	100Ω
49	R112	3001061210000	120Ω
50	R135	3001061210000	120Ω
51	R107	3001061510000	150Ω
52	R110	3001061510000	150Ω
53	R219	3001061510000	150Ω
54	R128	3001062210000	220Ω
55	R129	3001062210000	220Ω
56	R201	3001051020000	1KΩ
57	R210	3001051020000	1KΩ
58	R213	3001051020000	1KΩ
59	R223	3001051020000	1KΩ
60	R241	3001051020000	1KΩ
61	R246	3001061020010	1KΩ
62	R248	3001061520000	1.5KΩ
63	R231	3001051820000	1.8KΩ
64	R144	3001062720000	2.7KΩ
65	R101	3001063320000	3.3KΩ
66	R114	3001063320000	3.3KΩ
67	R117	3001063320000	3.3KΩ
68	R125	3001063320000	3.3KΩ
69	R137	3001063320000	3.3KΩ
70	R104	3001054720000	4.7KΩ
71	R205	3001054720000	4.7KΩ
72	R130	3001066820000	6.8KΩ
73	R105	3001068220000	8.2KΩ
74	R126	3001068220000	8.2KΩ
75	R131	3001068220000	8.2KΩ
76	R207	3001051030000	10KΩ
77	R226	3001051030000	10KΩ
78	R235	3001051030000	10KΩ
79	R118	3001061530010	15KΩ
80	R120	3001061530010	15KΩ
81	R139	3001061530010	15KΩ
82	R119	3001063930010	39KΩ
83	R229	3001054730010	47KΩ

No.	Ref. No.	Part No.	Description
84	R233	3001054730010	47KΩ
85	R115	3001064730000	47KΩ
86	R247	3001064730000	47KΩ
87	R255	3001064730000	47KΩ
88	R102	3001051040000	100KΩ
89	R103	3001051040000	100KΩ
90	R116	3001061040010	100KΩ
91	R243	3001061040010	100KΩ
92	R138	3001063030000	30KΩ
93	C115	3101060590010	0.5PF
94	C154	3101060590010	0.5PF
95	C208	3101060100010	1PF
96	C167	3101060200010	2PF
97	C169	3101060200010	2PF
98	C159	3101062490000	2.4PF
99	C163	3101060300010	3PF
100	C164	3101060300010	3PF
101	C206	3101060300010	3PF
102	C114	3101063690000	3.6PF
103	C118	3101063690000	3.6PF
104	C131	3101063690000	3.6PF
105	C151	3101063690000	3.6PF
106	C153	3101063690000	3.6PF
107	C125	3101060400010	4PF
108	C133	3101060400010	4PF
109	C215	3101060400010	4PF
110	C168	3101064790010	4.7PF
111	C101	3101060500010	5PF
112	C150	3101060500010	5PF
113	C152	3101060500010	5PF
114	C229	3101060500010	5PF
115	C111	3101060700020	7PF
116	C112	3101060800010	8PF
117	C239	3101061000000	10PF
118	C240	3101061000000	10PF
119	R211	3101061000000	10PF
120	C128	3101061200000	12PF
121	C129	3101061200000	12PF
122	C165	3101061200000	12PF
123	C166	3101061500010	15PF
124	C210	3101061500010	15PF
125	C160	3101062200010	22PF

No.	Ref. No.	Part No.	Description
126	C130	3101062400010	24PF
127	C120	3101062700010	27PF
128	C156	3101063300000	33PF
129	C113	3101063900000	39PF
130	C141	3101063900000	39PF
131	C116	3101065600000	56PF
132	C157	3101065600000	56PF
133	C254	3101068200000	82PF
134	C212	3101051010030	100PF
135	C213	3101051010030	100PF
136	C216	3101051010030	100PF
137	C221	3101051010030	100PF
138	C222	3101051010030	100PF
139	C225	3101051010030	100PF
140	C228	3101051010030	100PF
141	C281	3101061010010	100PF
142	C282	3101061010010	100PF
143	C285	3101061010010	100PF
144	C288	3101061010010	100PF
145	C289	3101061010010	100PF
146	C296	3101061010010	100PF
147	C297	3101061010010	100PF
148	C298	3101061010010	100PF
149	C299	3101061010010	100PF
150	C108	3101062210000	220PF
151	C117	3101062210000	220PF
152	C146	3101062210000	220PF
153	C158	3101062210000	220PF
154	C253	3101062210000	220PF
155	C102	3101054710010	470PF
156	C103	3101054710010	470PF
157	C104	3101054710010	470PF
158	C278	3101054710010	470PF
159	C283	3101054710010	470PF
160	C105	3101064710000	470PF
161	C110	3101064710000	470PF
162	C121	3101064710000	470PF
163	C123	3101064710000	470PF
164	C138	3101064710000	470PF
165	C148	3101064710000	470PF
166	C161	3101064710000	470PF
167	C171	3101064710000	470PF

No.	Ref. No.	Part No.	Description
168	C217	3101064710000	470PF
169	C262	3101064710000	470PF
170	C201	3101051020010	1000PF
171	C203	3101051020010	1000PF
172	C219	3101051020010	1000PF
173	C232	3101051020010	1000PF
174	C236	3101051020010	1000PF
175	C241	3101051020010	1000PF
176	C245	3101051020010	1000PF
177	C246	3101051020010	1000PF
178	C250	3101051020010	1000PF
179	C127	3101061020000	1000PF
180	C251	3101061020000	1000PF
181	C252	3101061020000	1000PF
182	C255	3101061020000	1000PF
183	C256	3101061020000	1000PF
184	C257	3101061020000	1000PF
185	C258	3101061020000	1000PF
186	C264	3101061020000	1000PF
187	C265	3101061020000	1000PF
188	C266	3101061020000	1000PF
189	C268	3101061020000	1000PF
190	C271	3101061020000	1000PF
191	C272	3101061020000	1000PF
192	C274	3101061020000	1000PF
193	C275	3101061020000	1000PF
194	C279	3101061020000	1000PF
195	C286	3101061020000	1000PF
196	C290	3101061020000	1000PF
197	C291	3101061020000	1000PF
198	C292	3101061020000	1000PF
199	C293	3101061020000	1000PF
200	C294	3101061020000	1000PF
201	C302	3101061020000	1000PF
202	C303	3101061020000	1000PF
203	C304	3101061020000	1000PF
204	C305	3101061020000	1000PF
205	C209	3101051030020	0.01UF
206	C224	3101062730000	0.027UF
207	C227	3101066830000	0.068UF
208	C223	3101061230000	0.012UF
209	C207	3101051040010	0.1UF

No.	Ref. No.	Part No.	Description
210	C211	3101051040010	0.1UF
211	C214	3101051040010	0.1UF
212	C220	3101051040010	0.1UF
213	C231	3101051040010	0.1UF
214	C234	3101051040010	0.1UF
215	C242	3101051040010	0.1UF
216	C243	3101051040010	0.1UF
217	C247	3101051040010	0.1UF
218	C248	3101051040010	0.1UF
219	C267	3101051040010	0.1UF
220	C284	3101051040010	0.1UF
221	C106	3101061040020	0.1UF
222	C109	3101061040020	0.1UF
223	C122	3101061040020	0.1UF
224	C124	3101061040020	0.1UF
225	C126	3101061040020	0.1UF
226	C139	3101061040020	0.1UF
227	C147	3101061040020	0.1UF
228	C162	3101061040020	0.1UF
229	C172	3101061040020	0.1UF
230	C226	3101061040020	0.1UF
231	C260	3101061040020	0.1UF
232	C261	3101061040020	0.1UF
233	C270	3101061040020	0.1UF
234	C276	3101061040020	0.1UF
235	C295	3101061040020	0.1UF
236	C233	3101074740000	0.47UF
237	C235	3101074740000	0.47UF
238	C204	3101051050160	1UF
239	C269	3101061050000	1UF
240	C287	3101061050000	1UF
241	C132	3101074750000	4.7UF
242	C107	3104074750070	4.7UF
243	C273	3104074750070	4.7UF
244	C259	3104086850030	6.8UF
245	C263	3104081060120	10UF
246	C277	3104081060120	10UF
247	C230	3104071060070	10UF
248	L126	3290106120000	12nH
249	L106	3237199120000	12.5nH
250	L119	3237199120000	12.5nH
251	L113	3210306180000	18nH

No.	Ref. No.	Part No.	Description
252	L124	3210306180000	18nH
253	L125	3210306180000	18nH
254	L204	3210306180000	18nH
255	R208	3210306180000	18nH
256	R212	3210306180000	18nH
257	R111	3210306220000	22nH
258	R134	3210306220000	22nH
259	L108	3217607330000	33nH
260	L120	3214307390000	39nH
261	L123	3210306560000	56nH
262	L111	3210106101000	100nH
263	L112	3210106101000	100nH
264	L210	3217607391000	390nH
265	L101	3217107471010	470nH
266	L104	3217107471010	470nH
267	L105	3217107471010	470nH
268	L109	3217107471010	470nH
269	L115	3217107471010	470nH
270	L117	3217107471010	470nH
271	L118	3217107471010	470nH
272	L121	3217107471010	470nH
273	L207	3213306561000	0.56uH
274	L102	3221506601000	Ferrite bead
275	L103	3221506601000	Ferrite bead
276	L107	3221506601000	Ferrite bead
277	L110	3221506601000	Ferrite bead
278	L122	3221506601000	Ferrite bead
279	L201	3221506601000	Ferrite bead
280	L202	3221506601000	Ferrite bead
281	L203	3221506601000	Ferrite bead
282	L205	3221506601000	Ferrite bead
283	L206	3221506601000	Ferrite bead
284	L208	3221506601000	Ferrite bead
285	L209	3221506601000	Ferrite bead
286	L211	3221506601000	Ferrite bead
287	L212	3221506601000	Ferrite bead
288	L213	3221506601000	Ferrite bead
289	L214	3221506601000	Ferrite bead
290	L215	3221506601000	Ferrite bead
291	L216	3221506601000	Ferrite bead
292	L217	3221506601000	Ferrite bead
293	L218	3221506601000	Ferrite bead

No.	Ref. No.	Part No.	Description
294	D101	3304060300050	Varactor
295	D103	3304060300050	Varactor
296	D104	3304060300050	Varactor
297	D105	3304060300050	Varactor
298	D107	3304060300050	Varactor
299	D108	3304060300050	Varactor
300	D109	3304060300050	Varactor
301	D110	3304060300050	Varactor
302	D112	3304010100890	Varactor
303	D102	3303240000000	Switching diode
304	D202	3303240000000	Switching diode
305	Q101	3408002000080	NPN transistor
306	Q107	3408002000080	NPN transistor
307	Q105	3404006000000	NPN transistor
308	Q106	3404006000000	NPN transistor
309	Q108	3404999000000	NPN transistor
310	Q103	3499000000150	Composite transistor
311	Q104	3403003000060	NPN transistor
312	Q202	3403002000000	PNP transistor
313	Q203	3403008000010	Bias resistor transistor
314	Q102	3503010000010	P-MOSFET
315	U202	3604019000000	PLL IC
316	U203	3616010000000	Switch IC
317	U204	3616010000000	Switch IC
318	U205	3616059000000	Switch IC
319	U207	3608006000000	Power management IC
320	U208	3608020000000	Power management IC
321	U209	3605002057090	Operational amplifier
322	X201	3701019250060	Temperature compensated crystal oscillator

Receiver Board

No.	Ref. No.	Part No.	Description
1	R141	3001050000000	0Ω
2	R160	3001050000000	0Ω
3	R166	3001050000000	0Ω
4	R167	3001050000000	0Ω
5	R168	3001050000000	0Ω
6	R510	3001050000000	0Ω
7	R513	3001050000000	0Ω
8	R515	3001050000000	0Ω
9	R516	3001050000000	0Ω
10	L116	3001060000000	0Ω
11	L423	3001060000000	0Ω
12	L433	3001060000000	0Ω
13	L519	3001060000000	0Ω
14	L612	3001060000000	0Ω
15	R119	3001060000000	0Ω
16	R121	3001060000000	0Ω
17	R139	3001060000000	0Ω
18	R409	3001060000000	0Ω
19	R420	3001060000000	0Ω
20	R427	3001060000000	0Ω
21	R453	3001060000000	0Ω
22	R502	3001060000000	0Ω
23	R609	3001060000000	0Ω
24	R615	3001060000000	0Ω
25	R619	3001060000000	0Ω
26	R622	3001060000000	0Ω
27	R623	3001060000000	0Ω
28	R129	3001051000000	10Ω
29	R133	3001051000000	10Ω
30	R419	3001061200000	12Ω
31	R455	3001061200000	12Ω
32	R421	3001063910000	390Ω
33	R422	3001063910000	390Ω
34	R107	3001061000000	10Ω
35	R109	3001061000000	10Ω
36	R436	3001061000000	10Ω
37	R130	3001051010000	100Ω
38	R132	3001051010000	100Ω
39	R106	3001061010000	100Ω
40	R117	3001061010000	100Ω
41	R454	3001061010000	100Ω

No.	Ref. No.	Part No.	Description
42	R608	3001061010000	100Ω
43	R610	3001061010000	100Ω
44	R614	3001061010000	100Ω
45	R618	3001061010000	100Ω
46	R626	3001061010000	100Ω
47	R627	3001061010000	100Ω
48	R632	3001061010000	100Ω
49	R633	3001061010000	100Ω
50	R136	3001051020000	1KΩ
51	R145	3001051020000	1KΩ
52	R150	3001051020000	1KΩ
53	R154	3001051020000	1KΩ
54	R158	3001051020000	1KΩ
55	R161	3001051020000	1KΩ
56	R607	3001061020010	1KΩ
57	R613	3001061020010	1KΩ
58	R616	3001061020010	1KΩ
59	R620	3001061020010	1KΩ
60	R624	3001061020010	1KΩ
61	R625	3001061020010	1KΩ
62	R628	3001061020010	1KΩ
63	R134	3001051030000	10KΩ
64	R144	3001051030000	10KΩ
65	R147	3001051030000	10KΩ
66	R124	3001061030010	10KΩ
67	R404	3001061030010	10KΩ
68	R152	3001051040000	100KΩ
69	R423	3001051040000	100KΩ
70	R456	3001051040000	100KΩ
71	R457	3001051040000	100KΩ
72	R458	3001051040000	100KΩ
73	R459	3001051040000	100KΩ
74	R460	3001051040000	100KΩ
75	R514	3001051040000	100KΩ
76	R102	3001061040010	100KΩ
77	R104	3001061040010	100KΩ
78	R405	3001061040010	100KΩ
79	R406	3001061040010	100KΩ
80	R407	3001061040010	100KΩ
81	R410	3001061040010	100KΩ
82	R412	3001061040010	100KΩ
83	R413	3001061040010	100KΩ

No.	Ref. No.	Part No.	Description
84	R414	3001061040010	100KΩ
85	R416	3001061040010	100KΩ
86	R417	3001061040010	100KΩ
87	R418	3001061040010	100KΩ
88	R411	3001071810000	180Ω
89	R142	3001065600000	56Ω
90	R509	3001051220000	1.2KΩ
91	R425	3001061220000	1.2KΩ
92	R430	3001061220000	1.2KΩ
93	R125	3001061500000	15Ω
94	R127	3001061500000	15Ω
95	R143	3001061500000	15Ω
96	R506	3001051510000	150Ω
97	R612	3001061520000	1.5KΩ
98	R617	3001061520000	1.5KΩ
99	R114	3001061530010	15KΩ
100	R115	3001061530010	15KΩ
101	R518	3001051820000	1.8KΩ
102	R151	3001051840000	180KΩ
103	R450	3001062030000	20KΩ
104	R122	3001062210000	220Ω
105	R123	3001062210000	220Ω
106	R138	3001062210000	220Ω
107	R118	3001062700000	27Ω
108	R108	3001061510000	150Ω
109	R128	3001061510000	150Ω
110	R504	3001052720000	2.7KΩ
111	R448	3001063030000	30KΩ
112	R451	3001063030000	30KΩ
113	R512	3001052210000	220Ω
114	R439	3001063310010	330Ω
115	R445	3001063310010	330Ω
116	R101	3001063320000	3.3KΩ
117	R110	3001063320000	3.3KΩ
118	R112	3001063320000	3.3KΩ
119	R113	3001063320000	3.3KΩ
120	R426	3001063620000	3.6KΩ
121	R501	3001054720000	4.7KΩ
122	R507	3001054720000	4.7KΩ
123	R103	3001064720000	4.7KΩ
124	R447	3001064720000	4.7KΩ
125	R149	3001054730000	47KΩ

No.	Ref. No.	Part No.	Description
126	R153	3001054730000	47KΩ
127	R606	3001064730000	47KΩ
128	R611	3001064730000	47KΩ
129	R621	3001064730000	47KΩ
130	R629	3001064730000	47KΩ
131	R630	3001064730000	47KΩ
132	R631	3001064730000	47KΩ
133	R635	3001064730000	47KΩ
134	R135	3001055100020	51Ω
135	R137	3001055100020	51Ω
136	R140	3001055100020	51Ω
137	R503	3001055100020	51Ω
138	R524	3001055100020	51Ω
139	R431	3001065100000	51Ω
140	R446	3001065100000	51Ω
141	R449	3001065100000	51Ω
142	R520	3001055110000	510Ω
143	R444	3001065120000	5.1KΩ
144	R429	3001065690000	5.6Ω
145	R441	3001065690000	5.6Ω
146	R508	3001055610000	560Ω
147	R505	3001055620000	5.6KΩ
148	R519	3001055620000	5.6KΩ
149	R452	3001065630000	56KΩ
150	R126	3001066820000	6.8KΩ
151	R434	3001068210010	820Ω
152	R435	3001068210010	820Ω
153	R440	3001068210010	820Ω
154	R442	3001068210010	820Ω
155	R443	3001068210010	820Ω
156	R468	3001076800000	68Ω
157	R424	3001071010000	100Ω
158	R428	3001071010000	100Ω
159	R437	3001061210000	120Ω
160	R438	3001061210000	120Ω
161	R111	3001052220000	2.2KΩ
162	R511	3001058220000	8.2KΩ
163	R105	3001065620000	5.6KΩ
164	R116	3001068220000	8.2KΩ
165	C147	3101065600000	56PF
166	C161	3101051000020	10PF
167	C182	3101051000020	10PF

No.	Ref. No.	Part No.	Description
168	C183	3101051000020	10PF
169	C434	3101061300000	13PF
170	C440	3101061300000	13PF
171	C140	3101061000000	10PF
172	C426	3101061000000	10PF
173	C432	3101061000000	10PF
174	C438	3101061000000	10PF
175	C444	3101061000000	10PF
176	C445	3101061000000	10PF
177	C446	3101061000000	10PF
178	C447	3101061000000	10PF
179	C448	3101061000000	10PF
180	C449	3101061000000	10PF
181	C470	3101061000000	10PF
182	C471	3101061000000	10PF
183	R432	3101061000000	10PF
184	C157	3101051010030	100PF
185	C159	3101051010030	100PF
186	C164	3101051010030	100PF
187	C171	3101051010030	100PF
188	C172	3101051010030	100PF
189	C173	3101051010030	100PF
190	C175	3101051010030	100PF
191	C528	3101051010030	100PF
192	C529	3101051010030	100PF
193	C538	3101051010030	100PF
194	C539	3101051010030	100PF
195	C464	3101061810010	180PF
196	C423	3101061010010	100PF
197	C424	3101061010010	100PF
198	C425	3101061010010	100PF
199	C430	3101061010010	100PF
200	C467	3101061010010	100PF
201	C468	3101061010010	100PF
202	C486	3101061010010	100PF
203	C488	3101061010010	100PF
204	C493	3101061010010	100PF
205	C627	3101061010010	100PF
206	C628	3101061010010	100PF
207	C631	3101061010010	100PF
208	C632	3101061010010	100PF
209	C637	3101061010010	100PF

No.	Ref. No.	Part No.	Description
210	C638	3101061010010	100PF
211	C639	3101061010010	100PF
212	C640	3101061010010	100PF
213	C651	3101061010010	100PF
214	C652	3101061010010	100PF
215	C653	3101061010010	100PF
216	C654	3101061010010	100PF
217	C679	3101061010010	100PF
218	C680	3101061010010	100PF
219	C681	3101061010010	100PF
220	C682	3101061010010	100PF
221	C151	3101051020010	1000PF
222	C162	3101051020010	1000PF
223	C168	3101051020010	1000PF
224	C185	3101051020010	1000PF
225	C195	3101051020010	1000PF
226	C196	3101051020010	1000PF
227	C509	3101051020010	1000PF
228	C515	3101051020010	1000PF
229	C525	3101051020010	1000PF
230	C531	3101051020010	1000PF
231	C407	3101061020000	1000PF
232	C408	3101061020000	1000PF
233	C413	3101061020000	1000PF
234	C485	3101061020000	1000PF
235	C499	3101061020000	1000PF
236	C602	3101061020000	1000PF
237	C603	3101061020000	1000PF
238	C605	3101061020000	1000PF
239	C614	3101061020000	1000PF
240	C615	3101061020000	1000PF
241	C617	3101061020000	1000PF
242	C625	3101061020000	1000PF
243	C626	3101061020000	1000PF
244	C633	3101061020000	1000PF
245	C635	3101061020000	1000PF
246	C636	3101061020000	1000PF
247	C641	3101061020000	1000PF
248	C642	3101061020000	1000PF
249	C643	3101061020000	1000PF
250	C644	3101061020000	1000PF
251	C647	3101061020000	1000PF

No.	Ref. No.	Part No.	Description
252	C650	3101061020000	1000PF
253	C655	3101061020000	1000PF
254	C656	3101061020000	1000PF
255	C660	3101061020000	1000PF
256	C661	3101061020000	1000PF
257	C663	3101061020000	1000PF
258	C666	3101061020000	1000PF
259	C668	3101061020000	1000PF
260	C669	3101061020000	1000PF
261	C671	3101061020000	1000PF
262	C672	3101061020000	1000PF
263	C674	3101061020000	1000PF
264	C675	3101061020000	1000PF
265	C677	3101061020000	1000PF
266	C678	3101061020000	1000PF
267	C683	3101061020000	1000PF
268	C684	3101061020000	1000PF
269	C685	3101061020000	1000PF
270	C155	3101051030020	0.01UF
271	C504	3101051030020	0.01UF
272	C512	3101051030020	0.01UF
273	C519	3101051030020	0.01UF
274	C535	3101051030020	0.01UF
275	C405	3101061030010	0.01UF
276	C412	3101061030010	0.01UF
277	C457	3101061030010	0.01UF
278	C152	3101051040060	0.1UF
279	C153	3101051040060	0.1UF
280	C156	3101051040060	0.1UF
281	C158	3101051040060	0.1UF
282	C169	3101051040060	0.1UF
283	C179	3101051040060	0.1UF
284	C180	3101051040060	0.1UF
285	C181	3101051040060	0.1UF
286	C184	3101051040060	0.1UF
287	C194	3101051040060	0.1UF
288	C197	3101051040060	0.1UF
289	C505	3101051040060	0.1UF
290	C506	3101051040060	0.1UF
291	C510	3101051040060	0.1UF
292	C511	3101051040060	0.1UF
293	C514	3101051040060	0.1UF

No.	Ref. No.	Part No.	Description
294	C516	3101051040060	0.1UF
295	C533	3101051040060	0.1UF
296	C534	3101051040060	0.1UF
297	C536	3101051040060	0.1UF
298	C537	3101051040060	0.1UF
299	C540	3101051040060	0.1UF
300	C541	3101051040060	0.1UF
301	C546	3101051040060	0.1UF
302	C547	3101051040060	0.1UF
303	C102	3101061040010	0.1UF
304	C104	3101061040010	0.1UF
305	C107	3101061040010	0.1UF
306	C123	3101061040010	0.1UF
307	C126	3101061040010	0.1UF
308	C129	3101061040010	0.1UF
309	C401	3101061040010	0.1UF
310	C409	3101061040010	0.1UF
311	C411	3101061040010	0.1UF
312	C473	3101061040010	0.1UF
313	C474	3101061040010	0.1UF
314	C475	3101061040010	0.1UF
315	C482	3101061040010	0.1UF
316	C483	3101061040010	0.1UF
317	C604	3101061040010	0.1UF
318	C606	3101061040010	0.1UF
319	C618	3101061040010	0.1UF
320	C623	3101061040010	0.1UF
321	C648	3101061040010	0.1UF
322	C658	3101061040010	0.1UF
323	C659	3101061040010	0.1UF
324	C667	3101061040010	0.1UF
325	C673	3101061040010	0.1UF
326	L424	3101061040010	0.1UF
327	C543	3101051050160	1uF
328	C550	3101051050160	1uF
329	C601	3101061050020	1UF
330	C613	3101061050020	1UF
331	C616	3101061050020	1UF
332	C634	3101061050020	1UF
333	C645	3101061050020	1UF
334	C646	3101061050020	1UF
335	C649	3101061050020	1UF

No.	Ref. No.	Part No.	Description
336	C657	3101061050020	1UF
337	C662	3101061050020	1UF
338	C670	3101061050020	1UF
339	C676	3101061050020	1UF
340	C664	3101081060010	10UF
341	C665	3101081060010	10UF
342	C113	3101061200000	12PF
343	C433	3101061200000	12PF
344	C439	3101061200000	12PF
345	C481	3101061200000	12PF
346	C523	3101051500020	15PF
347	C420	3101061500010	15PF
348	C427	3101061500010	15PF
349	L430	3101061500010	15PF
350	C545	3101055600000	56PF
351	C160	3101051800010	18PF
352	C524	3101051800010	18PF
353	R157	3101051800010	18PF
354	C487	3101061800000	18PF
355	C518	3101051810020	180PF
356	C527	3101052200010	22PF
357	C530	3101052200010	22PF
358	C542	3101052200010	22PF
359	C150	3101062000000	20PF
360	C134	3101062200010	22PF
361	C144	3101062200010	22PF
362	C503	3101052210020	220PF
363	C109	3101062210000	220PF
364	C117	3101062210000	220PF
365	C131	3101062210000	220PF
366	C148	3101062210000	220PF
367	C402	3101062210000	220PF
368	C410	3101062210000	220PF
369	C466	3101062210000	220PF
370	C165	3101062240000	0.22UF
371	C166	3101062240000	0.22UF
372	C465	3101062700010	27PF
373	C111	3101060300010	3PF
374	C112	3101060300010	3PF
375	C115	3101060300010	3PF
376	C116	3101060300010	3PF
377	C124	3101060300010	3PF

No.	Ref. No.	Part No.	Description
378	C135	3101060300010	3PF
379	C136	3101060300010	3PF
380	C143	3101060300010	3PF
381	C418	3101060300010	3PF
382	C431	3101060300010	3PF
383	C441	3101060300010	3PF
384	C508	3101050300000	3PF
385	C532	3101053000010	30PF
386	C421	3101063690000	3.6PF
387	C422	3101063690000	3.6PF
388	C428	3101063690000	3.6PF
389	C429	3101063690000	3.6PF
390	C119	3101063300000	33PF
391	C127	3101063300000	33PF
392	C137	3101063300000	33PF
393	C517	3101053920000	3900PF
394	C120	3101060400010	4PF
395	C133	3101060400010	4PF
396	C139	3101060400010	4PF
397	C417	3101060400010	4PF
398	C435	3101060400010	4PF
399	C462	3101060400010	4PF
400	C501	3101054700010	47PF
401	C556	3101054700010	47PF
402	C114	3101064300000	43PF
403	C163	3101054710010	470PF
404	C198	3101054710010	470PF
405	C507	3101054710010	470PF
406	C513	3101054710010	470PF
407	C521	3101054710010	470PF
408	C549	3101054710010	470PF
409	C101	3101064710000	470PF
410	C103	3101064710000	470PF
411	C105	3101064710000	470PF
412	C106	3101064710000	470PF
413	C108	3101064710000	470PF
414	C122	3101064710000	470PF
415	C125	3101064710000	470PF
416	C130	3101064710000	470PF
417	C456	3101064710000	470PF
418	C458	3101064710000	470PF
419	C128	3101060500010	5PF

No.	Ref. No.	Part No.	Description
420	C469	3101060500010	5PF
421	C472	3101060500010	5PF
422	C132	3101060900010	9PF
423	C476	3101060900010	9PF
424	C118	3101066800000	68PF
425	C154	3101050600010	6PF
426	C186	3101050600010	6PF
427	C526	3101050600010	6PF
428	C416	3101060600010	6PF
429	C436	3101060600010	6PF
430	C442	3101060600010	6PF
431	C443	3101060600010	6PF
432	C460	3101060600010	6PF
433	C461	3101060600010	6PF
434	C415	3101060800010	8PF
435	C121	3101051040010	0.1UF
436	C146	3101061590010	1.5PF
437	C149	3101061590010	1.5PF
438	C494	3101064700000	47PF
439	C170	3101066830000	0.068UF
440	C190	3101066830000	0.068UF
441	C522	3101072240000	0.22UF
442	C176	3101071050160	1UF
443	C548	3104071050070	1UF
444	C189	3101072250030	2.2UF
445	C110	3104074750070	4.7UF
446	C178	3104071060070	10UF
447	C520	3104071060070	10UF
448	L110	3217106121000	120nH
449	L416	3210209102010	1uH
450	L505	3213212103000	10uH
451	L506	3213212103000	10uH
452	L106	3237199190010	18.5n
453	L117	3237199190010	18.5n
454	L404	3210106150000	15nH
455	L405	3210106150000	15nH
456	L403	3213209151000	150nH
457	L124	3210306150000	15nH
458	L419	3210306150000	15nH
459	L420	3210306150000	15nH
460	L421	3210306150000	15nH
461	R155	3210305180000	18nH

No.	Ref. No.	Part No.	Description
462	L112	3210306820000	82nH
463	L412	3210306180000	18nH
464	L429	3212206181000	180nH
465	L507	3217607221000	220nH
466	L516	3213212332000	3.3uH
467	L418	3210306330000	33nH
468	L113	3210306270000	27nH
469	L107	3217607330000	33nH
470	L119	3217607330000	33nH
471	C479	3210406331000	330nH
472	L425	3210406331000	330nH
473	L517	3210406331000	330nH
474	L518	3213306332000	3.3uH
475	L427	3210306470000	47nH
476	L428	3210306470000	47nH
477	L511	3210406471000	470nH
478	L101	3217107471010	470nH
479	L104	3217107471010	470nH
480	L105	3217107471010	470nH
481	L109	3217107471010	470nH
482	L111	3217107471010	470nH
483	L114	3217107471010	470nH
484	L118	3217107471010	470nH
485	L120	3217107471010	470nH
486	L610	3213209471000	470nH
487	L128	3213306561000	0.56uH
488	R517	3213306561000	0.56uH
489	L102	3221506601000	Ferrite bead
490	L103	3221506601000	Ferrite bead
491	L108	3221506601000	Ferrite bead
492	L121	3221506601000	Ferrite bead
493	L122	3221506601000	Ferrite bead
494	L123	3221506601000	Ferrite bead
495	L125	3221506601000	Ferrite bead
496	L126	3221506601000	Ferrite bead
497	L127	3221506601000	Ferrite bead
498	L401	3221506601000	Ferrite bead
499	L402	3221506601000	Ferrite bead
500	L417	3221506601000	Ferrite bead
501	L422	3221506601000	Ferrite bead
502	L501	3221506601000	Ferrite bead
503	L502	3221506601000	Ferrite bead

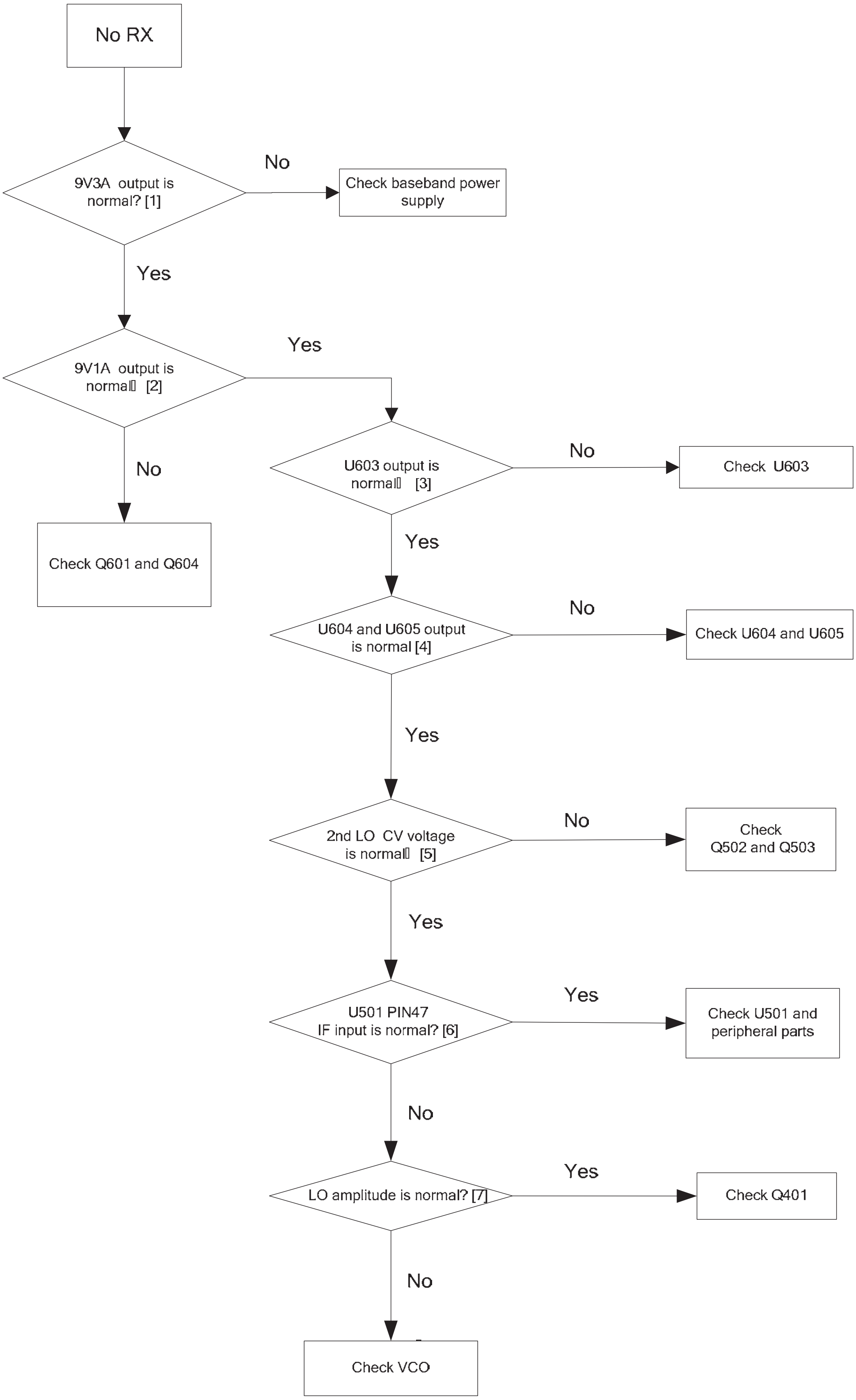
No.	Ref. No.	Part No.	Description
504	L503	3221506601000	Ferrite bead
505	L504	3221506601000	Ferrite bead
506	L508	3221506601000	Ferrite bead
507	L509	3221506601000	Ferrite bead
508	L510	3221506601000	Ferrite bead
509	L512	3221506601000	Ferrite bead
510	L513	3221506601000	Ferrite bead
511	L514	3221506601000	Ferrite bead
512	L515	3221506601000	Ferrite bead
513	L601	3221506601000	Ferrite bead
514	L602	3221506601000	Ferrite bead
515	L603	3221506601000	Ferrite bead
516	L604	3221506601000	Ferrite bead
517	L605	3221506601000	Ferrite bead
518	L606	3221506601000	Ferrite bead
519	L607	3221506601000	Ferrite bead
520	L608	3221506601000	Ferrite bead
521	L609	3221506601000	Ferrite bead
522	L611	3221506601000	Ferrite bead
523	L426	3213306821000	0.82uH
524	L406	3231351640000	Air-core inductor
525	L407	3231351640000	Air-core inductor
526	L408	3231351640000	Air-core inductor
527	L409	3231351640000	Air-core inductor
528	L410	3231351640000	Air-core inductor
529	L411	3231351640000	Air-core inductor
530	L413	3231351640000	Air-core inductor
531	L414	3231351640000	Air-core inductor
532	L415	3231351640000	Air-core inductor
533	D102	3303240000000	Switching diode
534	D110	3303240000000	Switching diode
535	D501	3303240000000	Switching diode
536	D401	3304010100890	Varactor
537	D402	3304010100890	Varactor
538	D403	3304010100890	Varactor
539	D405	3304010100890	Varactor
540	D406	3304010100890	Varactor
541	D407	3304010100890	Varactor
542	D409	3304010100890	Varactor
543	D410	3304010100890	Varactor
544	D411	3304010100890	Varactor
545	D412	3304010100890	Varactor

No.	Ref. No.	Part No.	Description
546	D413	3304010100890	Varactor
547	D414	3304010100890	Varactor
548	D415	3304010100890	Varactor
549	D416	3304010100890	Varactor
550	D417	3304010100890	Varactor
551	D418	3304010100890	Varactor
552	D419	3304010100890	Varactor
553	D420	3304010100890	Varactor
554	D421	3304010100890	Varactor
555	D422	3304010100890	Varactor
556	D423	3304010100890	Varactor
557	D424	3304010100890	Varactor
558	D425	3304010100890	Varactor
559	D426	3304010100890	Varactor
560	D101	3304060300050	Varactor
561	D103	3304060300050	Varactor
562	D104	3304060300050	Varactor
563	D105	3304060300050	Varactor
564	D106	3304060300050	Varactor
565	D107	3304060300050	Varactor
566	D108	3304060300050	Varactor
567	D109	3304060300050	Varactor
568	D502	3304060300050	Varactor
569	D503	3304060300010	Varactor
570	D404	3399990000260	Rectifier diode
571	D408	3399990000260	Rectifier diode
572	Q102	3503010000010	P-MOSFET
573	Q101	3408002000080	NPN transistor
574	Q107	3408002000080	NPN transistor
575	Q105	3404006000000	NPN transistor
576	Q106	3404006000000	NPN transistor
577	Q402	3404006000000	NPN transistor
578	Q403	3404006000000	NPN transistor
579	Q401	3404999000000	NPN transistor
580	Q104	3403003000060	NPN transistor
581	Q502	3403003000060	NPN transistor
582	Q601	3403002000000	PNP transistor
583	Q604	3403002000000	PNP transistor
584	Q503	3408002000000	NPN transistor
585	Q602	3403008000010	Bias resistor transistor
586	Q603	3403008000010	Bias resistor transistor
587	U402	3601039000060	LNA amplifier

No.	Ref. No.	Part No.	Description
588	U602	3608020000000	Power management IC
589	U603	3608020000000	Power management IC
590	U606	3608020000000	Power management IC
591	U601	3608006000000	Power management IC
592	U604	3608006000000	Power management IC
593	U605	3608006000000	Power management IC
594	U105	3616010000000	Switch IC
595	U101	3604019000000	PLL IC
596	U103	3616059000000	Switch IC
597	U106	3605002057090	Operational amplifier
598	U403	3609014000010	Mixer
599	U501	3603999000000	IF processor IC
600	U401	3605008001690	Operational amplifier
601	Q103	3499000000150	Composite transistor
602	X101	3701019250030	Temperature compensated crystal oscillator
603	Z401	3802733540030	Crystal filter

11.8 Troubleshooting Flow Chart

Receiver Circuit



Description of Normal Situations:

[1] About 9.3V for receiver board.

[2] About 9.1V for pin 2 of Q601 and Q604.

[3] About 5V for pin 5 of U603.

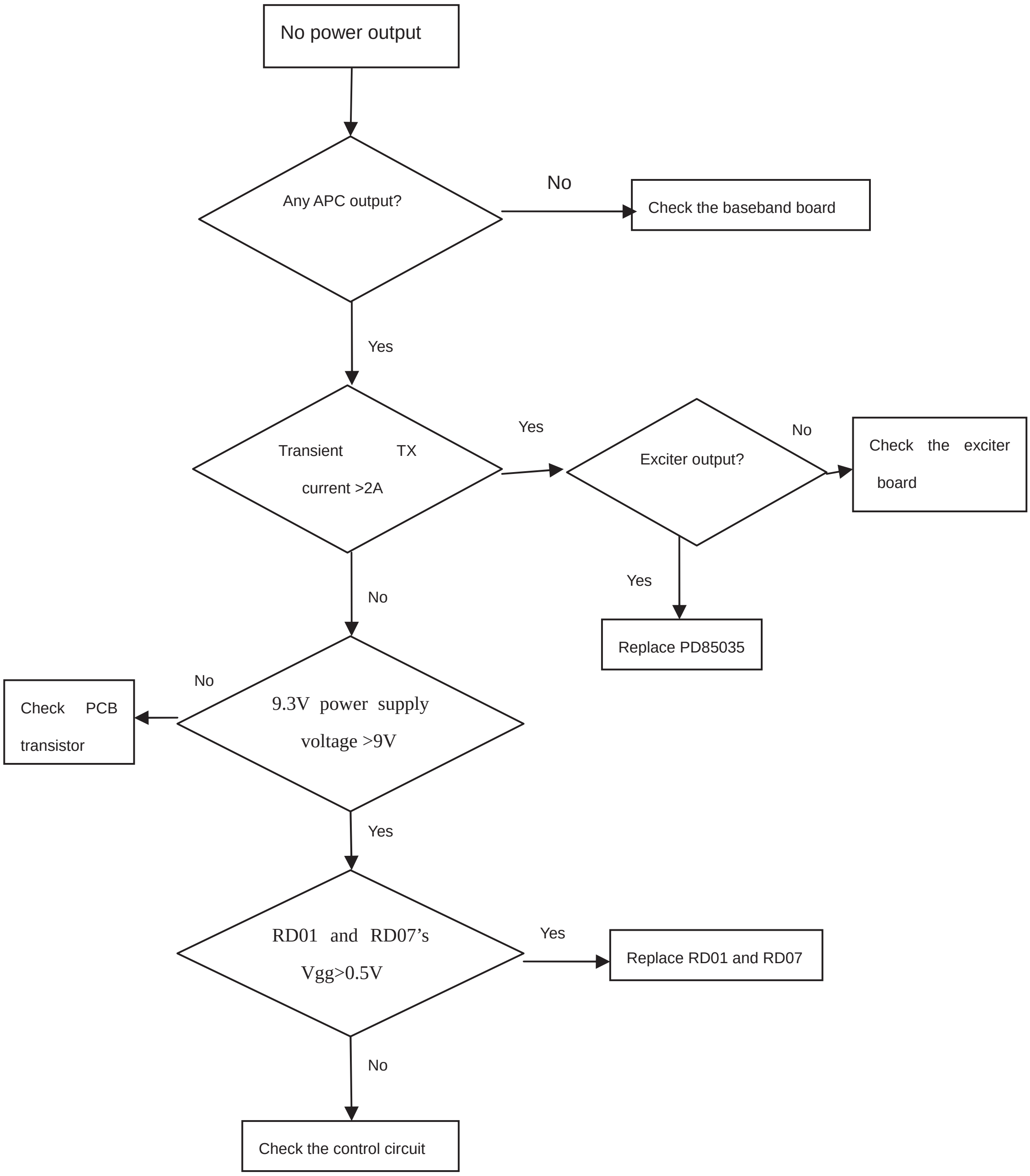
[4] About 3.3V for pin 5 of U604 and U605.

[5] Normal CV voltage is 0.7-1.5V. The test point is TP504.

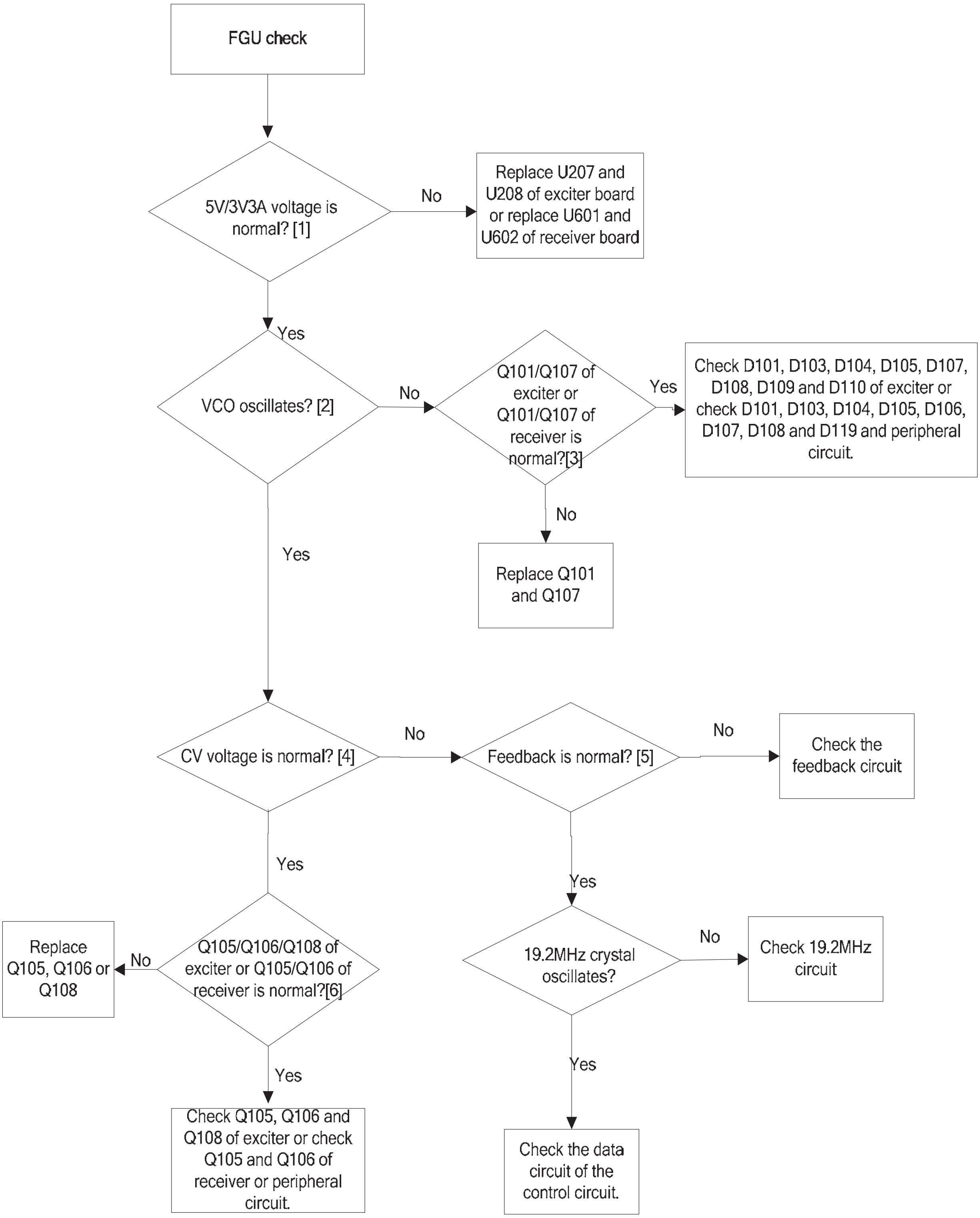
[6] Disconnect the front-end circuit and input 73.35MHz IF signal at pin 47 of U501; the sensitivity should be about-107dBm.

[7] Amplitude of 1st LO is 16-19dBm.

Transmitter Circuit



FGU Circuit


FGU check
5V/3V3A voltage is normal? [1]
No
Replace U207 and U208 of exciter board or replace U601 and U602 of receiver board
Yes
VCO oscillates? [2]
No
Q101/Q107 of exciter or Q101/Q107 of receiver is normal?[3]
Yes
Check D101, D103, D104, D105, D107, D108, D109 and D110 of exciter or check D101, D103, D104, D105, D106, D107, D108 and D119 and peripheral circuit.
No
Replace Q101 and Q107
Yes
CV voltage is normal? [4]
No
Feedback is normal? [5]
No
Check the feedback circuit
Yes
Yes
Q105/Q106/Q108 of exciter or Q105/Q106 of receiver is normal?[6]
No
Replace Q105, Q106 or Q108
19.2MHz crystal oscillates?
No
Check 19.2MHz circuit
Yes
Check Q105, Q106 and Q108 of exciter or check Q105 and Q106 of receiver or peripheral circuit.
Yes
Check the data circuit of the control circuit.

Description of Normal Situations:

[1] VCO: 5V; PLL: 3.3V;

[2] Frequency output for low VCO is 320～380MHz, and 350～415MHz for high VCO. The power output amplitude for both is -8～18dBm;

[3] CV voltage of Q101 and Q107: about 4V; the voltage difference between base voltage and emitter voltage is about 0.6V;

[4] Normal CV voltage is 0.6V-4.4V;

[5] Normal feedback amplitude is -8～-17dBm;

[6] CV voltage of Q105, Q106 and Q108: about 6V; the voltage difference between base voltage and emitter voltage is about 0.6V;

12.VHF (136-174MHz) Information

12.1 TX Circuit

The TX circuit consists of power amplifier (PA) circuit, power control circuit, diagnosis and detection circuit and protection circuit. It is to amplify the RF signal from exciter module to 50W, which then will be output via the antenna. The power control circuit is used for keeping the RF power of antenna at a fixed level. For the diagnosis and detection circuit, it detects the current TX power, antenna VSWR and transmitter temperature, and sends the detection result to the repeater’s control unit for monitoring the transmitter status. The role of protection circuit is to protect the power amplifier from being damaged due to high temperature or VSWR.

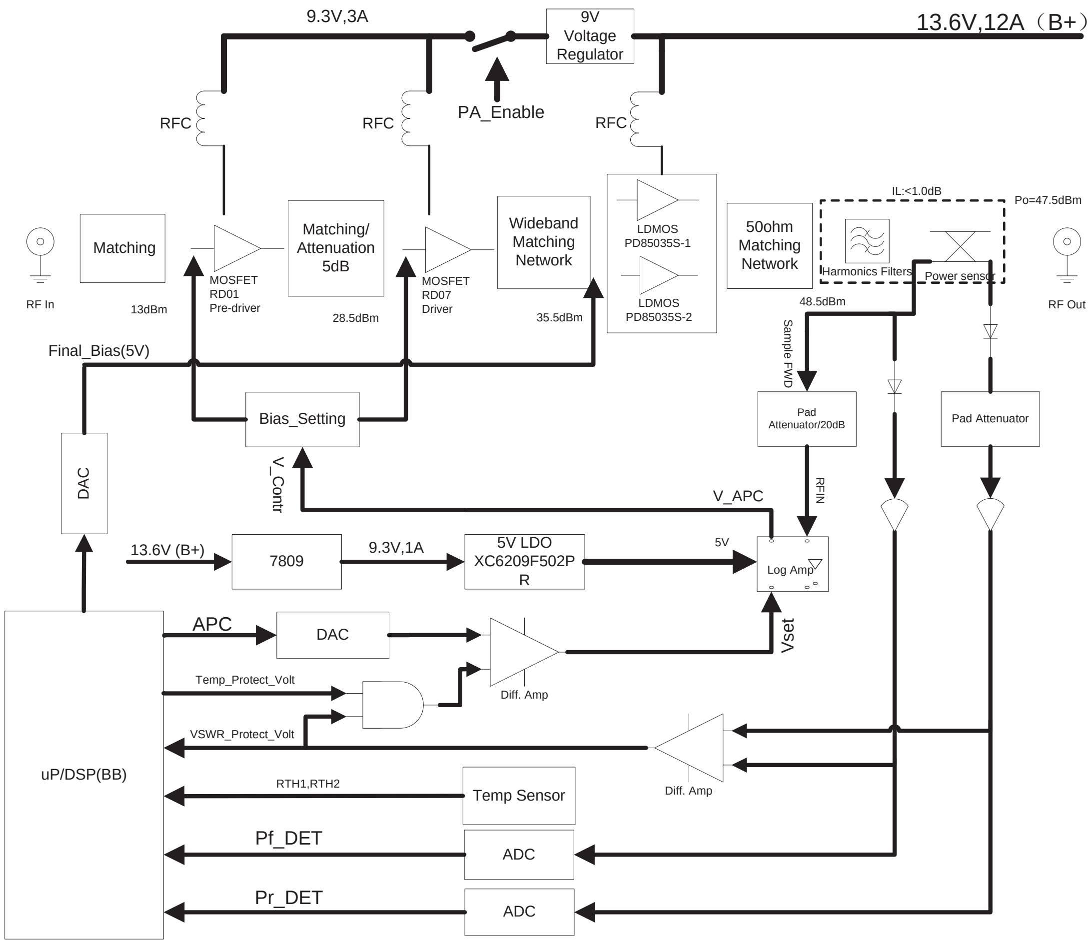


Figure 12-1 Block Diagram of PA Board

PA Module

PA module of transmitter consists of a 3-stage PA unit: pre-driver stage (Q401), driver stage (Q402) and final-stage (Q403 and Q404). Q401 and Q402 form the driver circuit, whose gain can be adjusted via the APC circuit, ensuring a constant RF power output of 50W.

Pre-driver Stage PA

This PA unit is a LDMOS power tube (Q401). It can amplify the 13dBm RF signals from exciter unit to 30dBm, which then will be sent to driver-stage PA via L-C network.

Driver Stage PA

This PA unit is a LDMOS power tube (Q402). It can further amplify the RF signals from Q401 to 38dBm, which is then sent to final-stage PA.

Final-stage PA

This PA unit consists of two LDMOS power tubes (Q403 and Q404). It can reduce the Q value of power input/output network and expand the bandwidth of PA circuit, ensuring PA circuit performance.

Harmonic Suppression filter

The harmonic filter of transmitter is a four-order LPF filter comprising C455, C453, C457, L410, C456, C458, C542, L412, C459, C461, L413, C460, C463, C462, L414, C464, C465 and C466. It can decrease the harmonic component by increasing the out-of-band rejection capability.

Directional Coupler

The role of directional coupler is to detect forward and reverse power, so as to monitor and diagnose the operating status of transmitter. The forward power passes through a π-type attenuator, and then goes into the logarithmic amplifier, where it can automatically limit the output power of the transmitter to a relatively constant value (50W) according to the preset power level “Vset”. After going to the analog-to-digital converter (ADC) on the baseband board via the diode D402, the forward power is used to calculate the current TX power of the transmitter, which will be displayed in the diagnosis software in a real-time way. The directional coupler locates behind the LPF and is near the antenna output end. It is used to detect the reverse power. After going to the ADC on the baseboard via the diode D401, the reverse power is used to calculate the VSWR of antenna connector. An alarm will be generated when the VSWR is larger than the set threshold. Both forward and reverse detection voltages are calculated via a differential amplifier circuit (U407A). The output value is used to control the power level “Vset”. When the VSWR is too high, the TX power will be reduced to avoid damage to the PA.

Power Control

The transmitter power is controlled by power control circuit composed of logarithmic amplifier and directional coupler. After the transmitter power passes through the directional coupler, the detected RF signal goes to RF_IN of logarithmic amplifier via the Pi-type attenuator. Then the detected RF signal will adjust the output “Vapc” of logarithmic amplifier in a real time way based on the current power level “Vset”, so as to control the bias voltage at the gates of Q401 and Q402 and to ensure a constant output

power.

Temperature Protection

The thermistor RT402 is close to the heat sink pad of the final-stage amplifier, and is used to detect the current temperature of the heat sink. When the temperature of heat sink rises to the default value, the fan will run; when the temperature drops to a certain level, the fan will stop running.

When the temperature is above ℃, the control unit will send an alarm signal. If the temperature rises continuously, the temperature protection circuit (U407B) will output a control voltage, to reduce the power level Vset, thus reducing the transmitter power and protecting the PA. When the temperature falls below ℃, Vset and transmitter power will restore to their normal levels. Naturally, the alarm will dissolve.

Low-voltage and Over-voltage Protection

The control unit detects the voltage of system power supply in a real time way. When the voltage is below 12V, the control unit will reduce the TX power to 30W, ensuring no damage to the driver amplifier of transmitter. When the voltage is above 14.6V, it will reduce the power level to 40W, ensuring no damage to the final-stage amplifier of transmitter.

12.2 RX Circuit

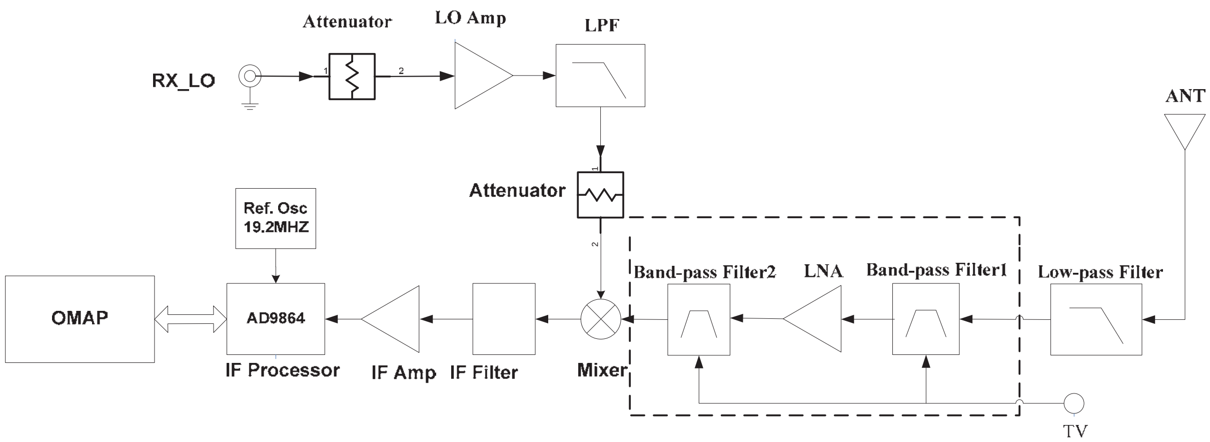


Figure 12-2 Block Diagram of Receiver Circuit

The receiver circuit mainly comprises the RF band-pass filter, low-noise amplifier, mixer, IF filter, IF amplifier and IF processor.

Front-end Circuit

The HF signal from the low-pass filter passes through the electrically tunable band-pass filter controlled via TV level, to remove out-of-band interference signal and to send wanted band-pass signal to the low-noise amplifier (U402). The amplified signal goes to a band-pass filter controlled via TV level, to

remove out-of-band interference signal generated during amplification, and to send wanted HF signal to the mixer.

The wanted signal passes through the RF band-pass filter and low-noise amplifier and goes to the mixer (U403). Meanwhile, the first local oscillator (LO) signal generated by VCO passes through the low-pass filter and also goes to the mixer. In the mixer, the wanted signal and the first LO signal are mixed to generate the first IF signal (44.85MHz). Then the signal passes through the LC to suppress carrier other than the first IF signal, and to increase the isolation between the mixer and the IF filter. After that, the first IF signal goes to crystal filter (Z401) for filtering, and is sent to the two-stage IF amplifier circuit for amplification. Then the amplified signal goes to the IF processor U501 for further processing.

Rear-end Circuit

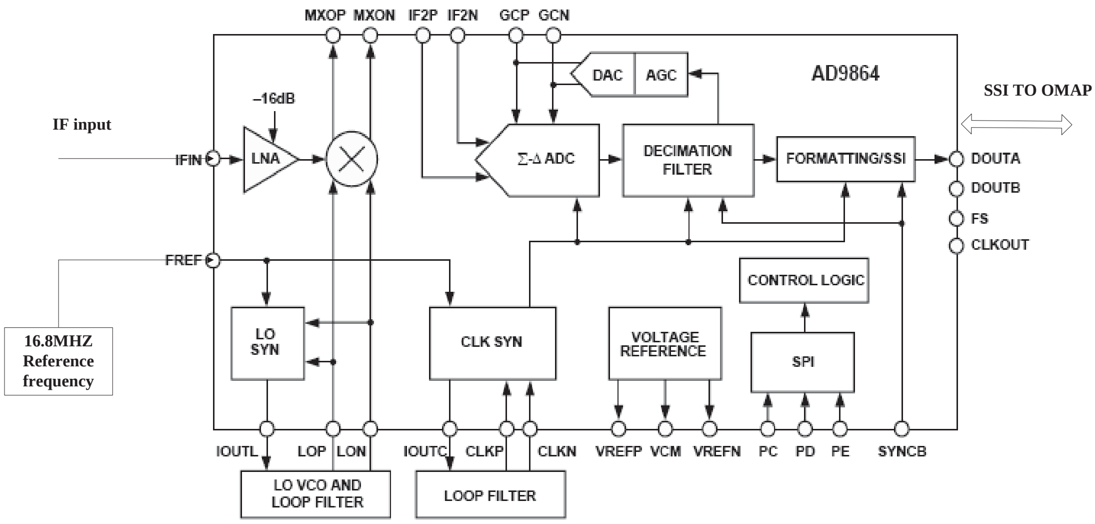


Figure 12-3 Diagram of IF Processor

The first IF signal (44.85MHz) output by the IF amplifier goes into U501 via Pin 47, where the signal is converted to the second IF signal (2.25MHz). Then the signal is converted to digital signal via ADC sampling, and output via the SSI interface. Finally, the digital signal is sent to DSP (OMAP5912) for demodulation.

U501 employs reference frequency of 19.2MHz and shares the crystal with OMAP. The second LO VCO comprises an oscillator, a varactor and some other components, to provide the 42.6/47.1MHz LO signal. The 18MHz clock frequency is generated by the LC resonance loop.

12.3 Frequency Generation Unit (FGU)

The repeater has two FGUs. One is RX FGU providing the first LO frequency for the RX system; the

other is TX FGU providing carrier and exciter signal for the TX system. They work simultaneously, but are locked at different frequencies.

Both RX FGU and TX FGU mainly consist of a reference crystal oscillator, a PLL, a VCO and a buffer amplifier. The PLL data is configured via OMAP.

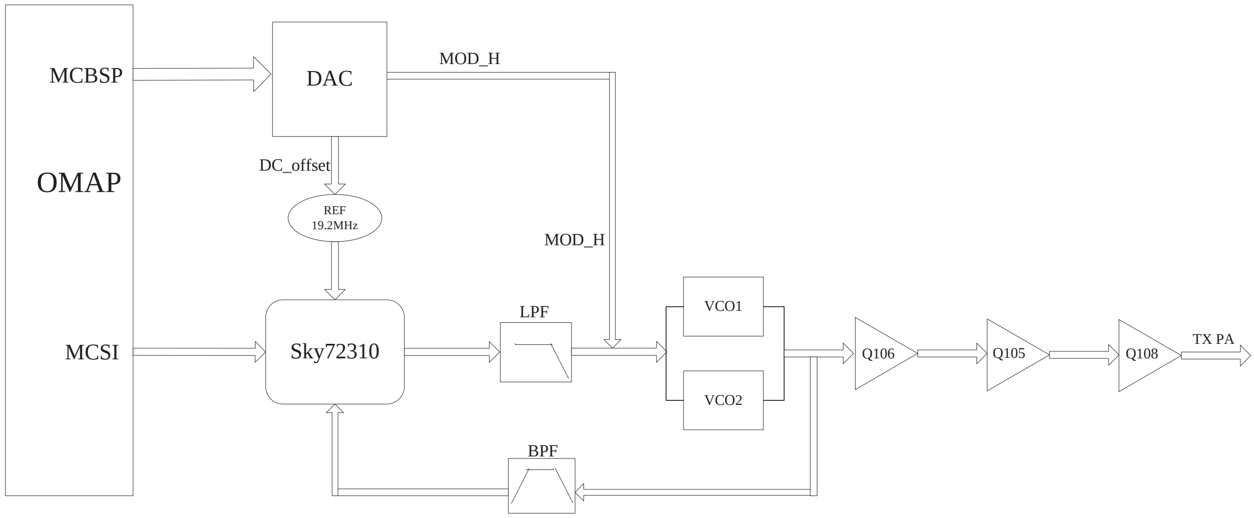


Figure 12-4 Block Diagram of Transmitter

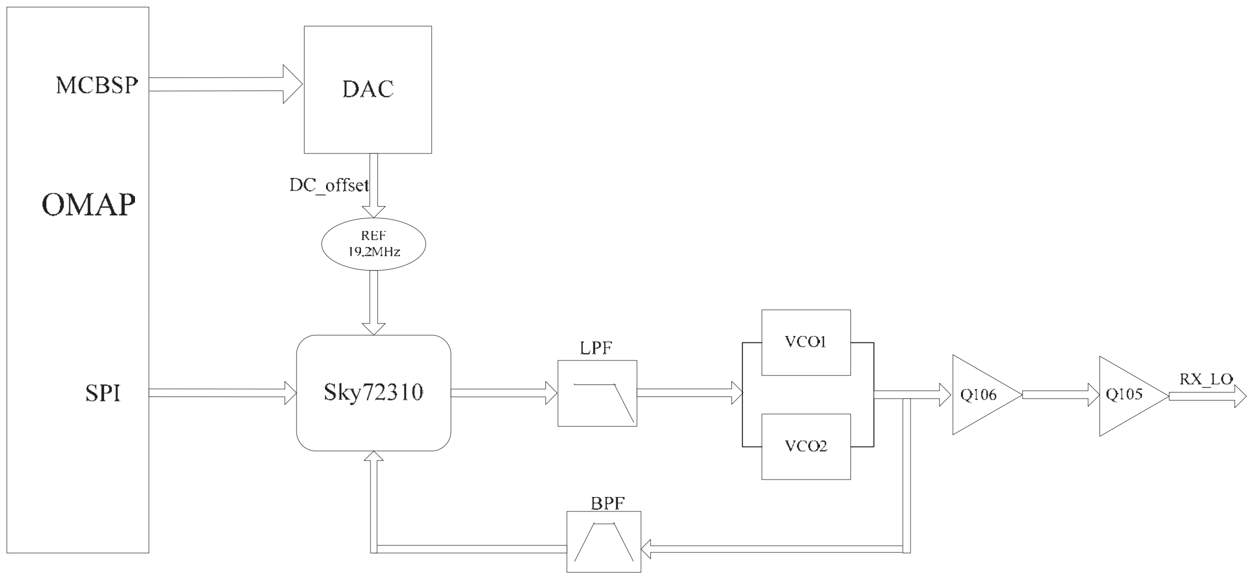


Figure 12-5 Block Diagram of Receiver

Reference Oscillator

The reference crystal oscillator is a temperature compensated crystal oscillator with a frequency of 19.2MHz. You can control the oscillator by adjusting the DC voltage output by the digital-to-analog converter, so as to ensure frequency accuracy.

PLL IC

The PLL is a fractional frequency divider (SKY72310), which consists of the pre-divider, programmable

divider, phase detector, charge pump and etc. The voltage of analog circuit and digital circuit of PLL IC is 3.3V voltage, while the voltage of charge pump is 5V. See the following figure:

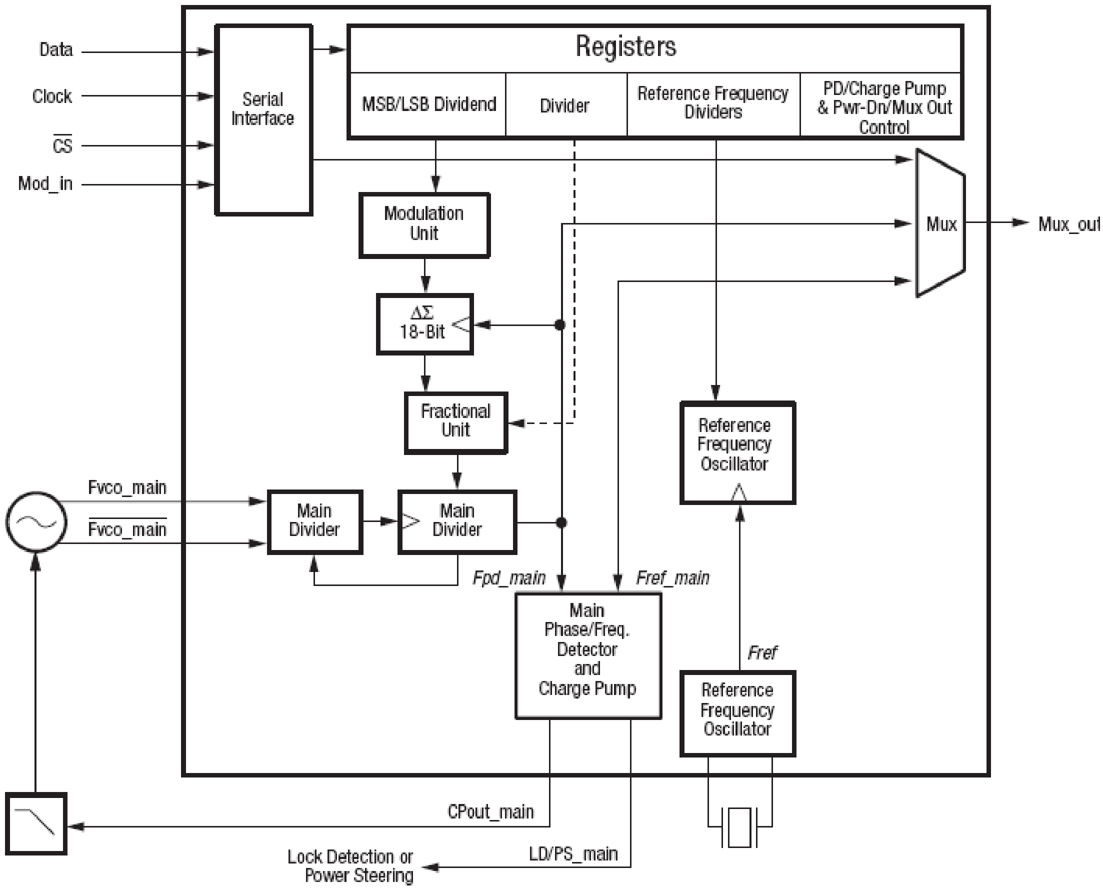


Figure 12-6 Block Diagram of PLL IC

SKY72310's role is to generate appropriate frequency based on the data transmitted by OMAP of baseband board. The 19.2MHz frequency generated by the reference crystal oscillator goes into the PLL, to generate the reference frequency. Meanwhile, the frequency generated by VCO goes into PLL for frequency division. The resulting frequency will be compared with reference frequency in terms of phase difference in the phase detector. After comparison, the resulting frequency is converted to CV voltage via the loop filter, to control the output frequency of VCO. In addition, as a key component of the modulation circuit, PLL can directly obtain data from the MCSI port of OMAP for modulation.

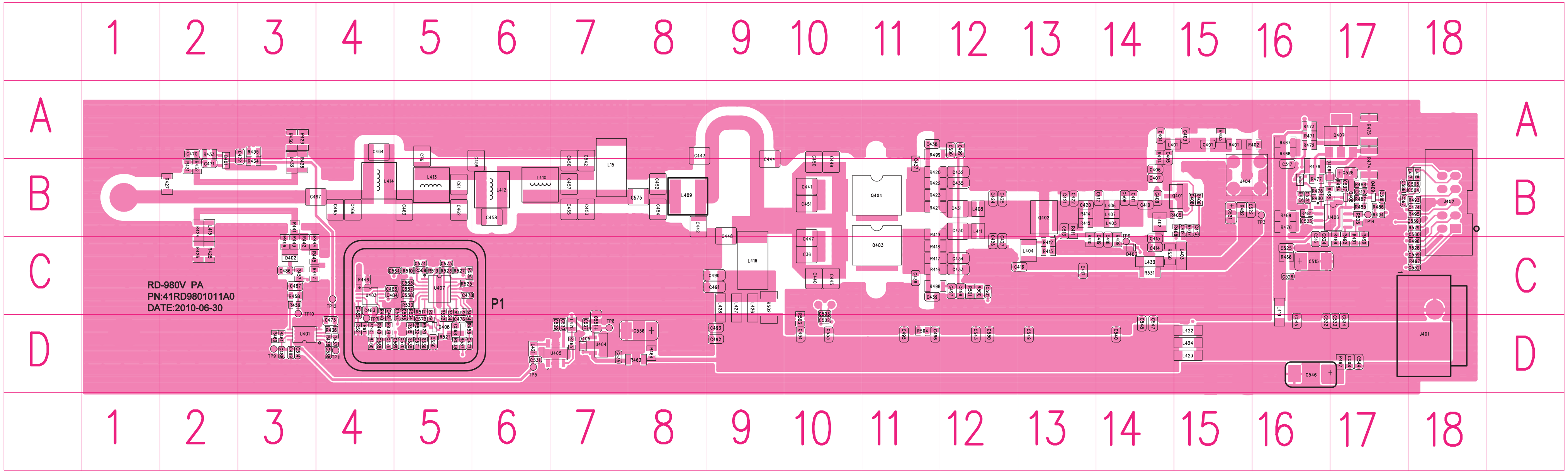
VCO

The VCO for RX unit comprises two transistors (Q101 and Q107), a varactor and four Colpitts oscillators. Q105 and Q106 are the buffer amplifiers for the RX unit.

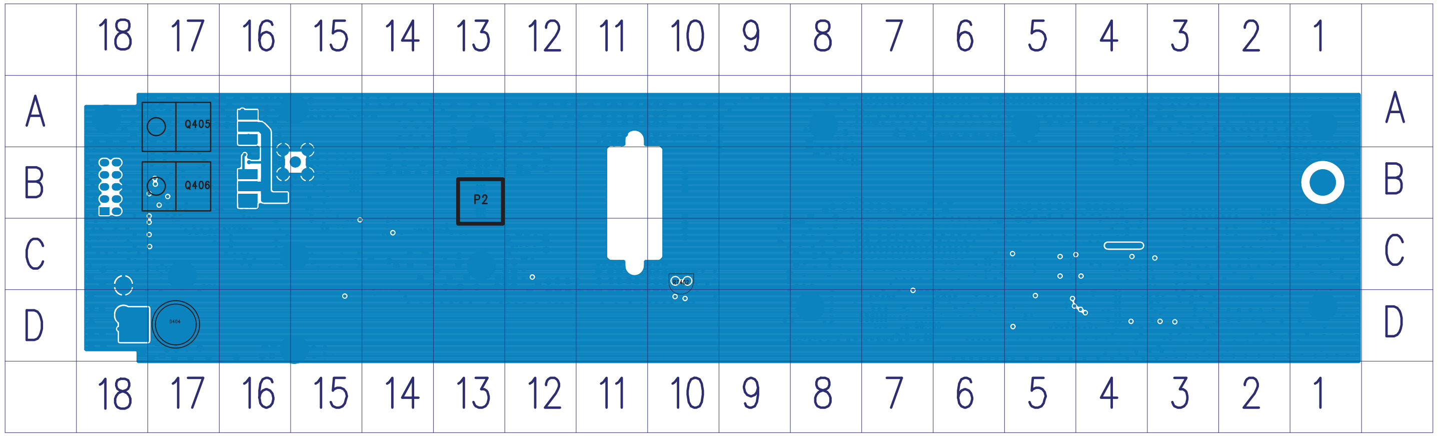
The VCO for exciter unit comprises two transistors (Q101 and Q107), a varactor and four Colpitts oscillators. Q105 and Q106 are the buffer amplifiers for the exciter unit.

12.4 PCB View

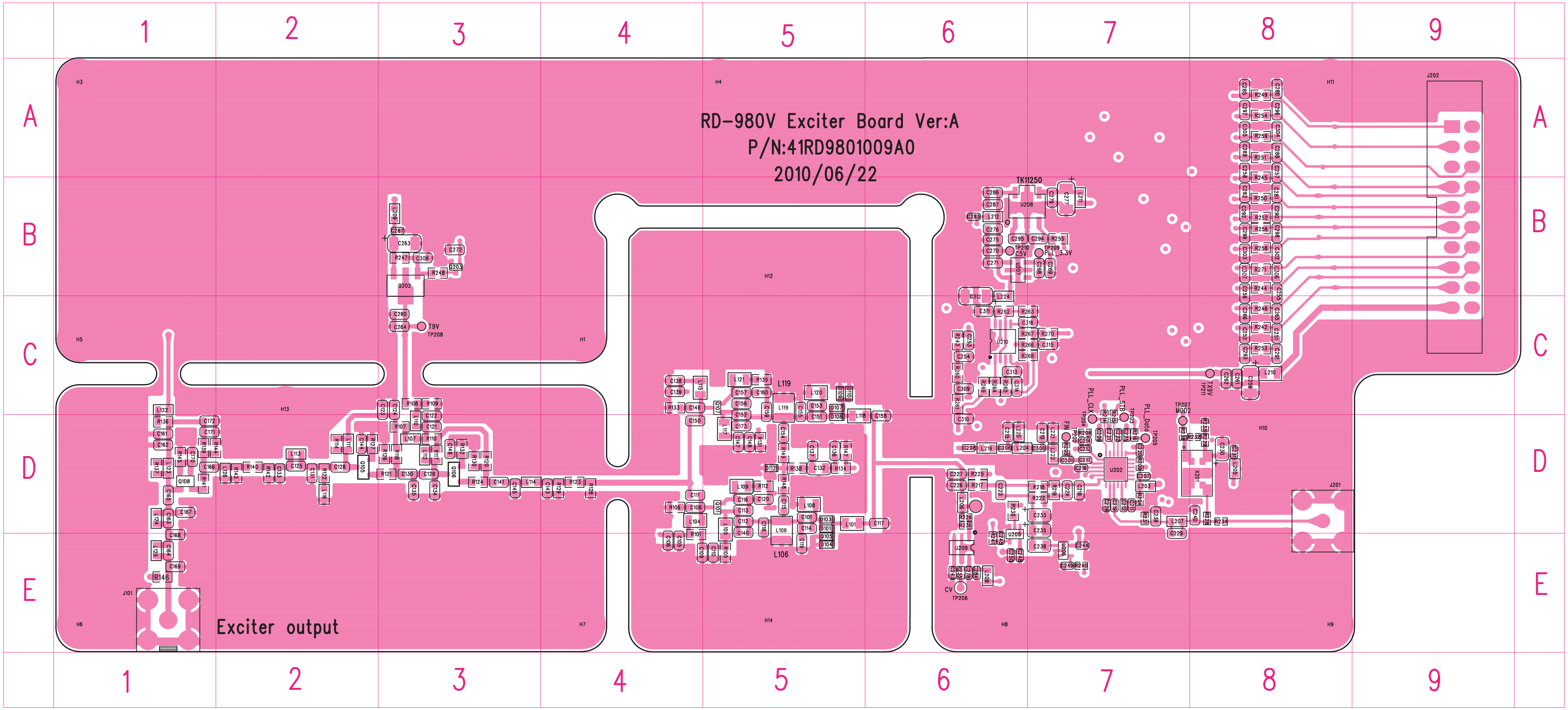
RD98X PCB View (PA Board)
Top Layer



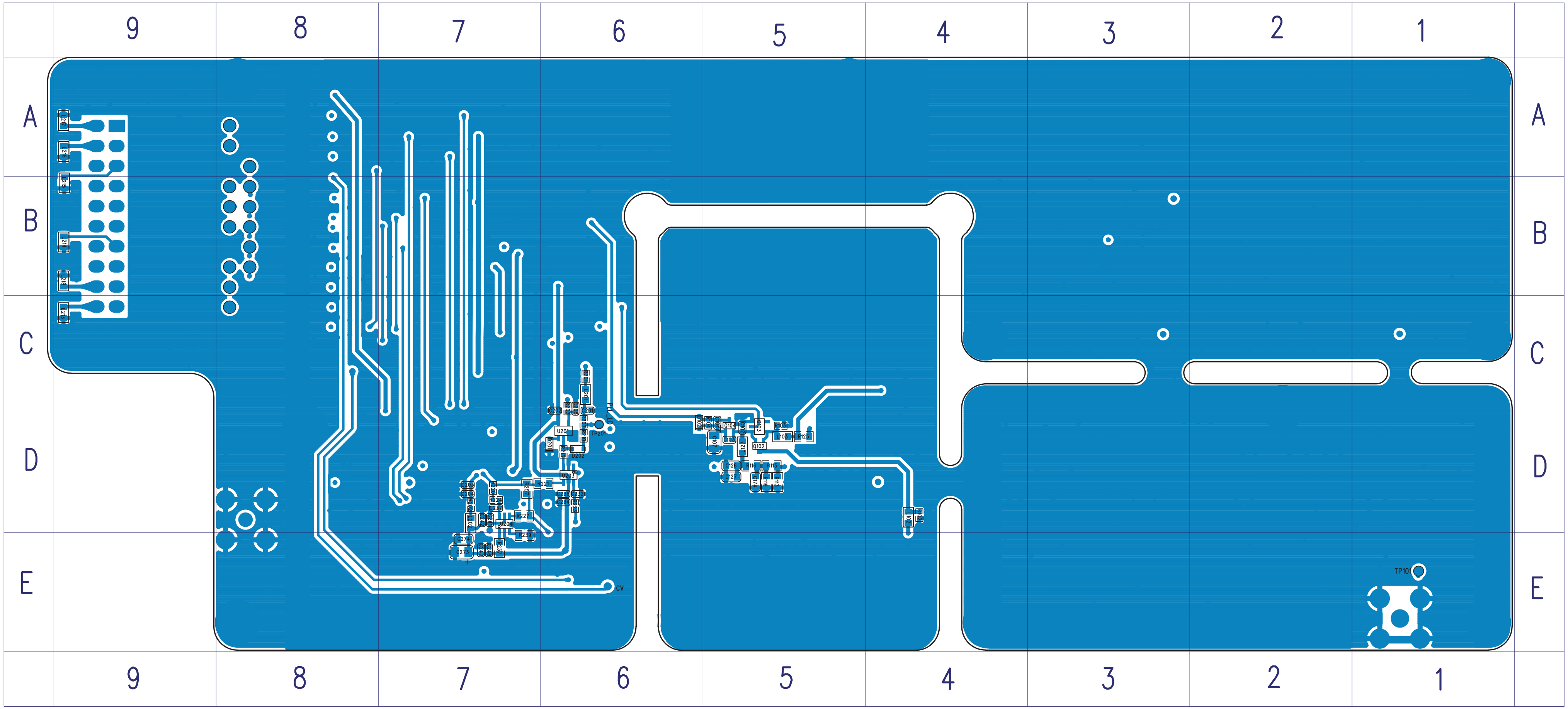
RD98X PCB View (PA Board)
Bottom Layer



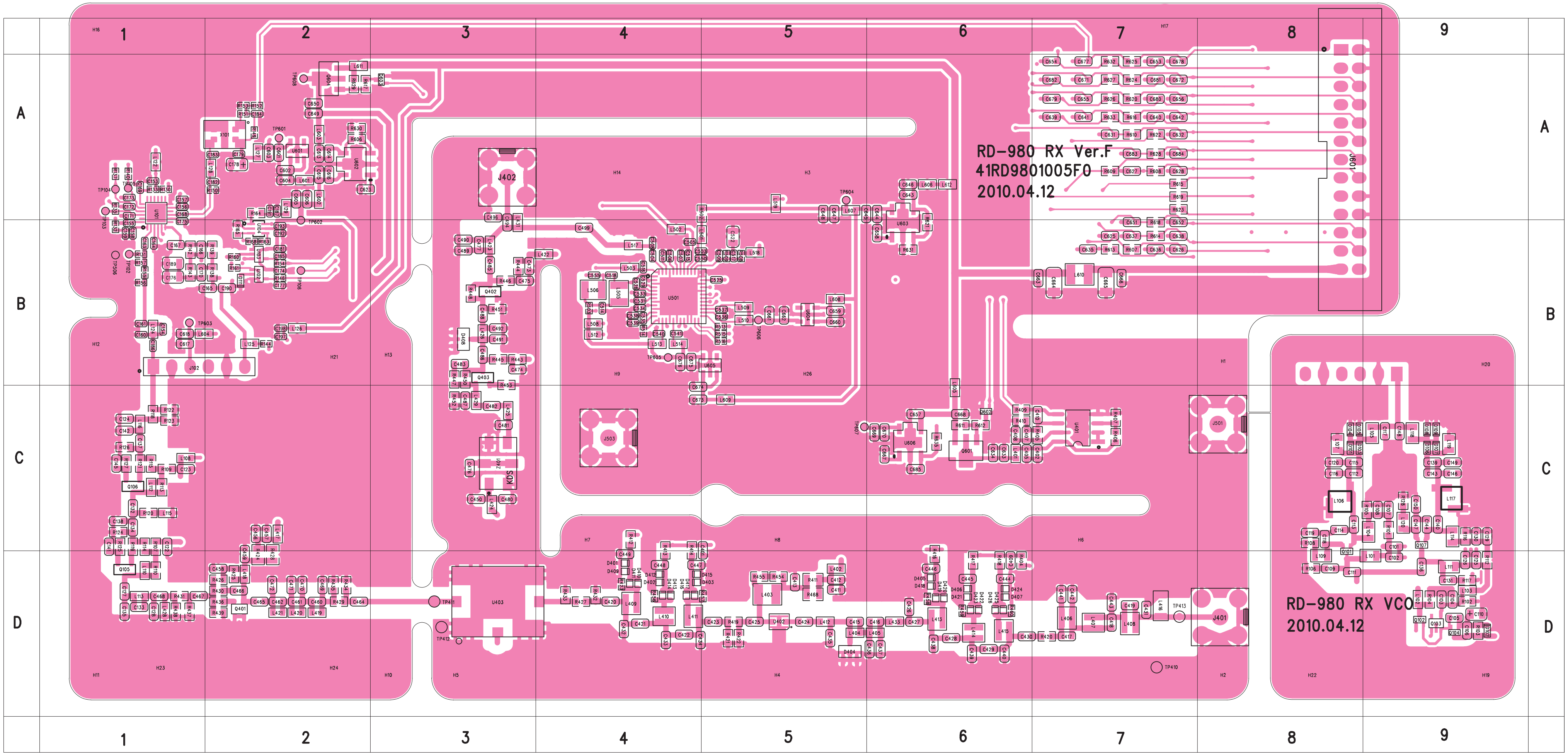
RD98X PCB View (Exciter Board)
Top Layer



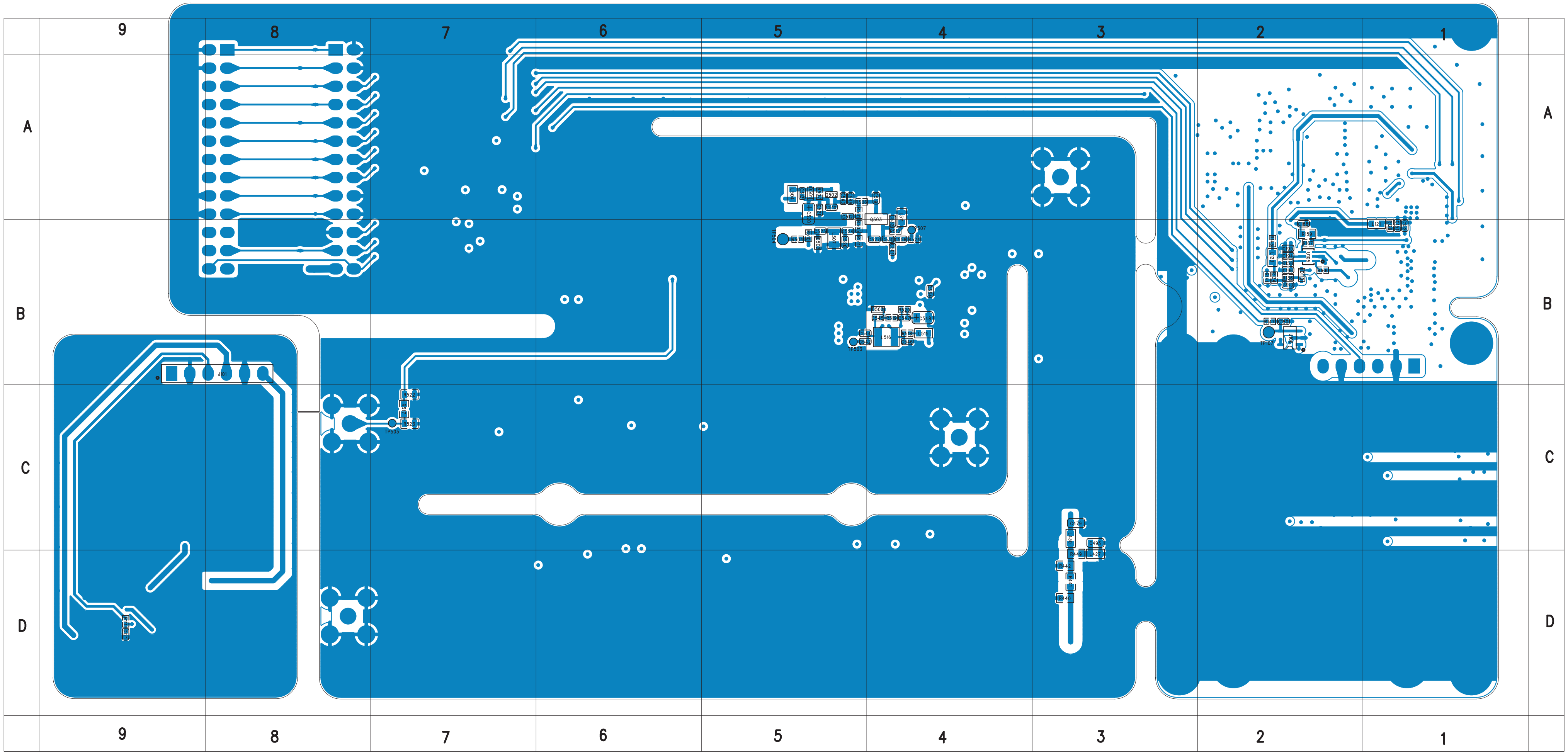
RD98X PCB View (Exciter Board)
Bottom Layer



RD98X PCB View (RX Board)
Top Layer

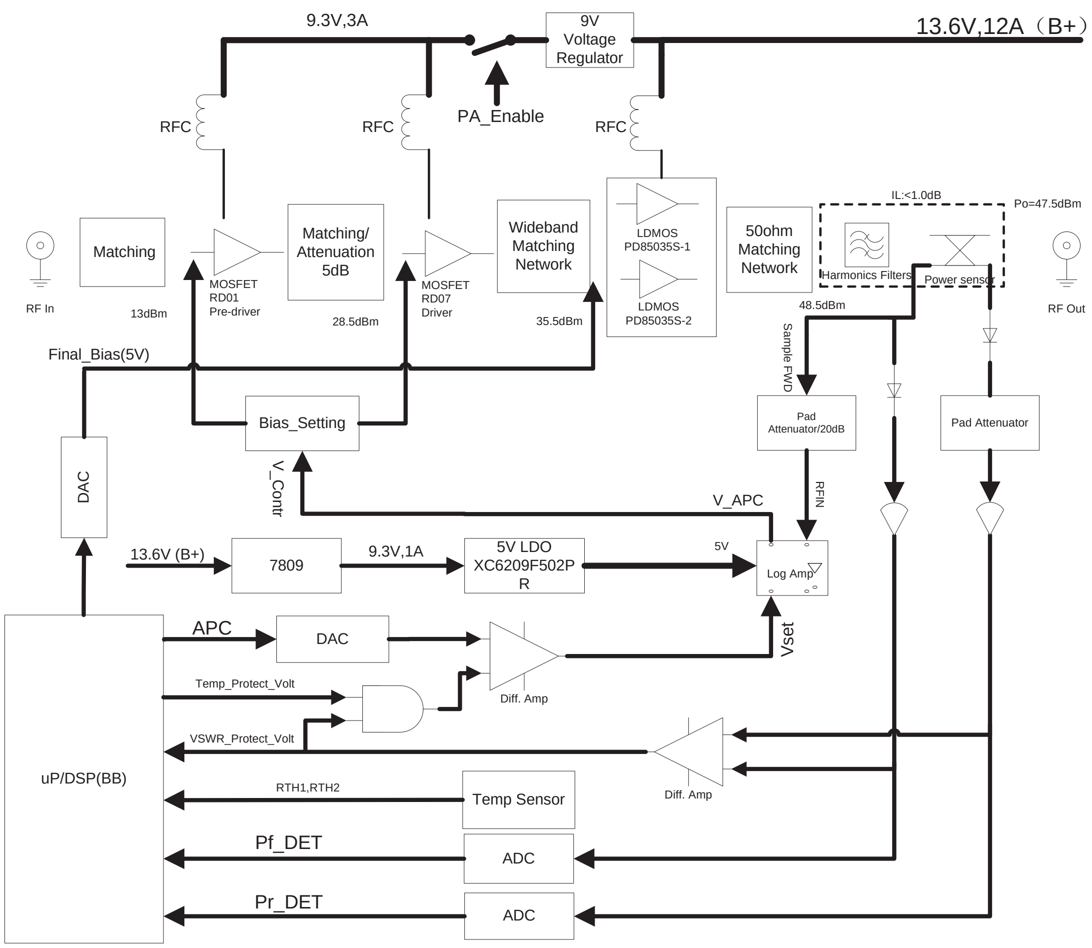


RD98X PCB View (RX Board)
Bottom Layer

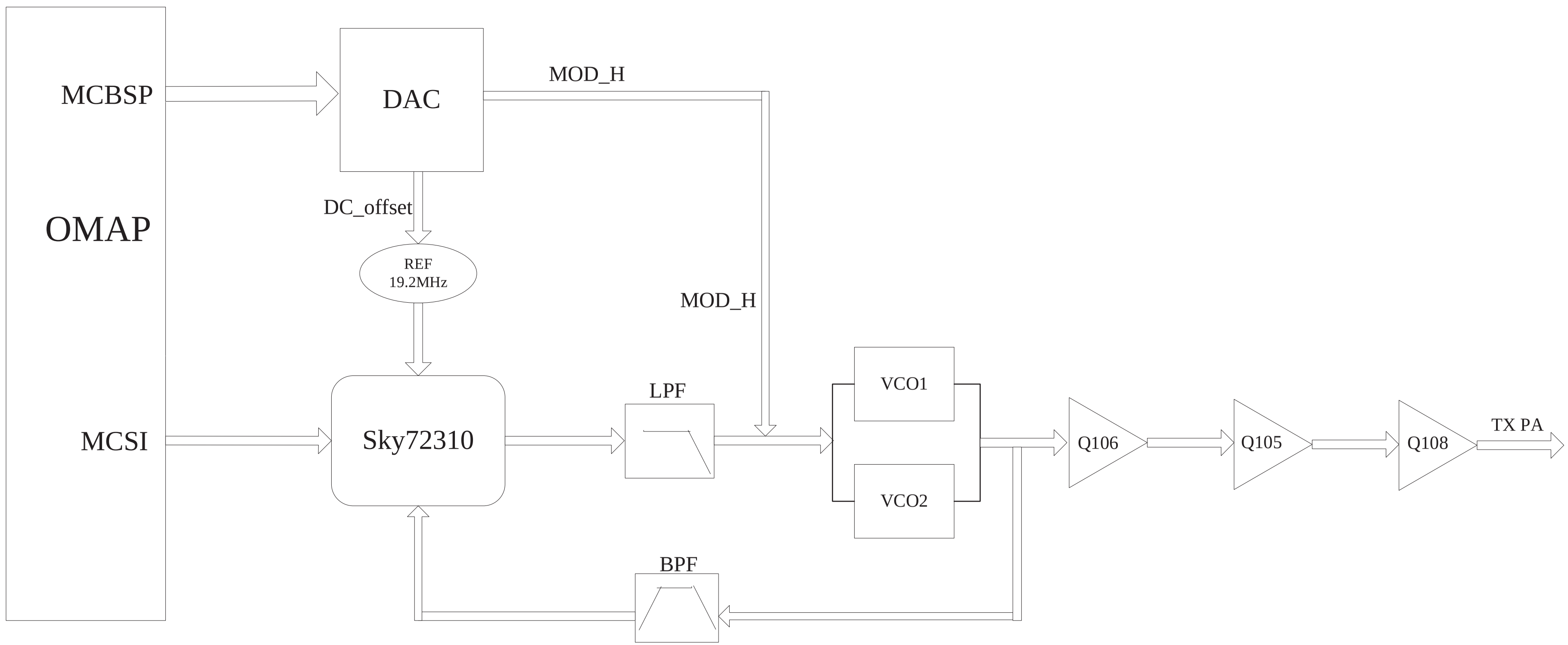


12.5 Block Diagram

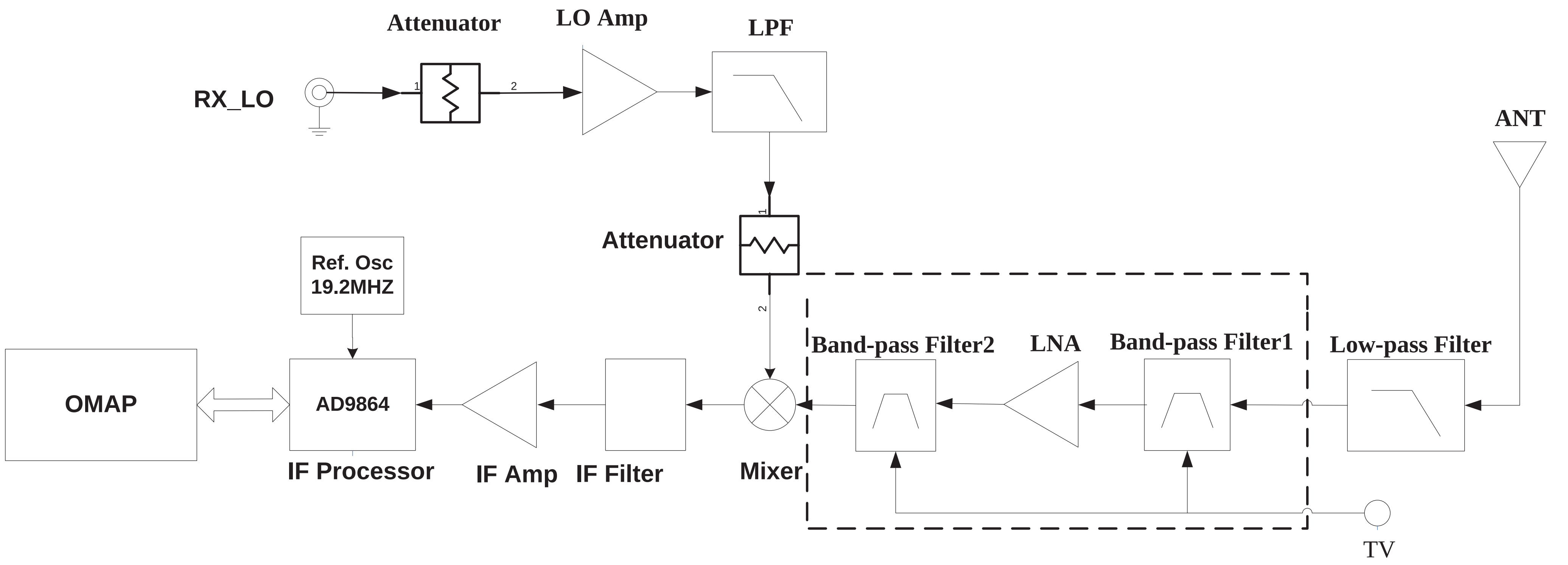
RD98X Block Diagram (PA Section)



RD98X Block Diagram (Exciter Section)

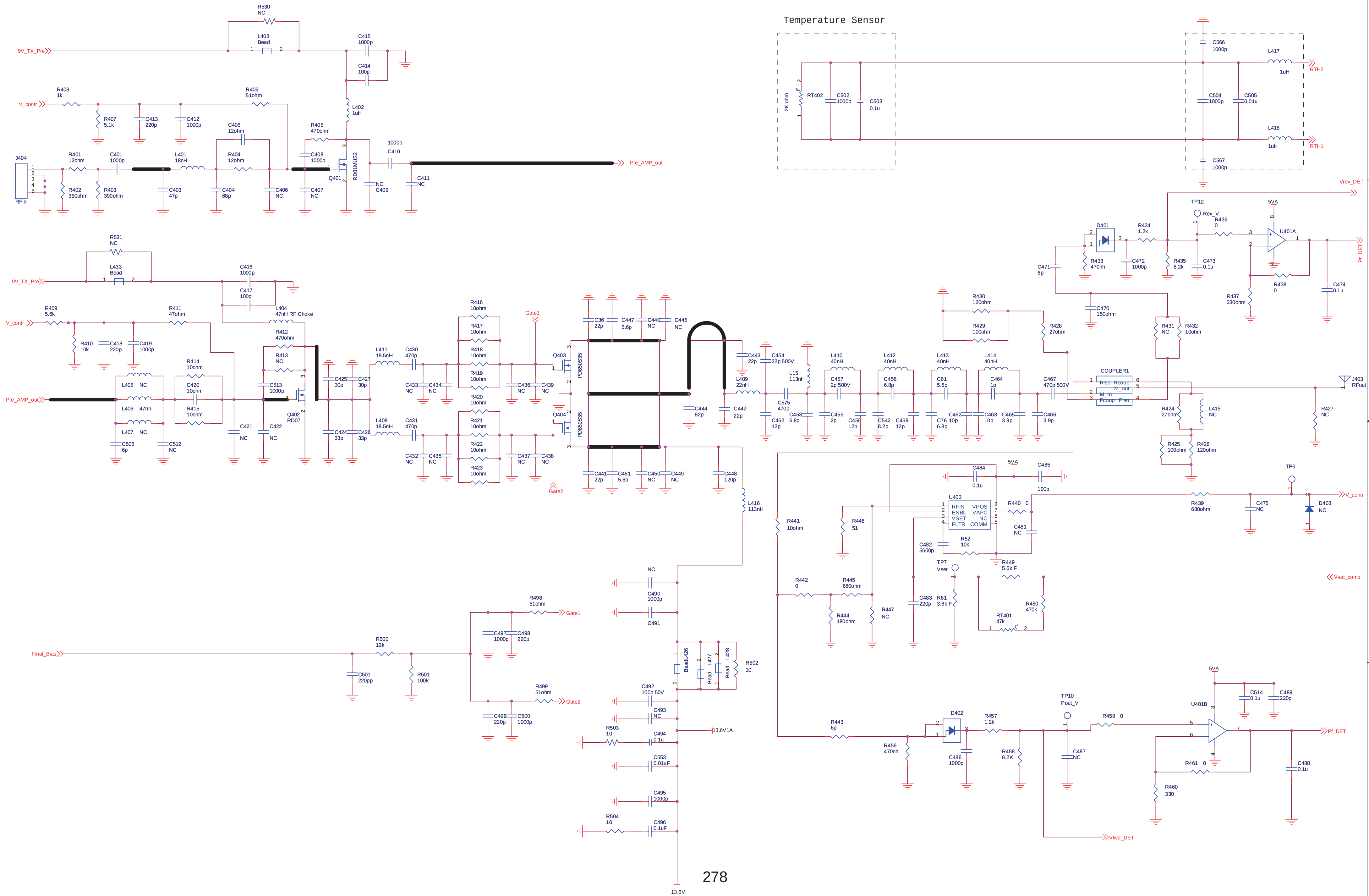


RD98X Block Diagram (RX Section)

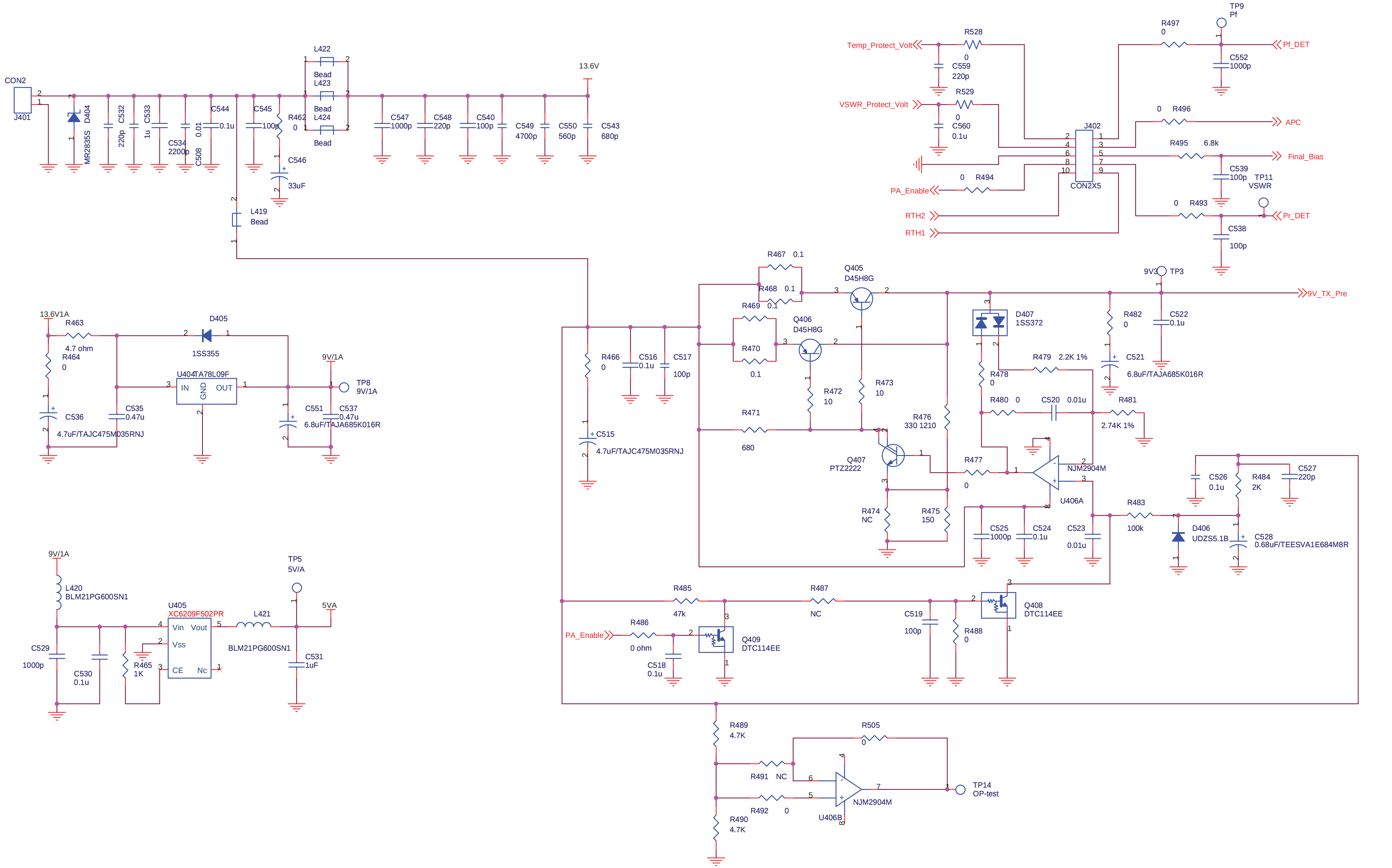


12.6 Schematic Diagram

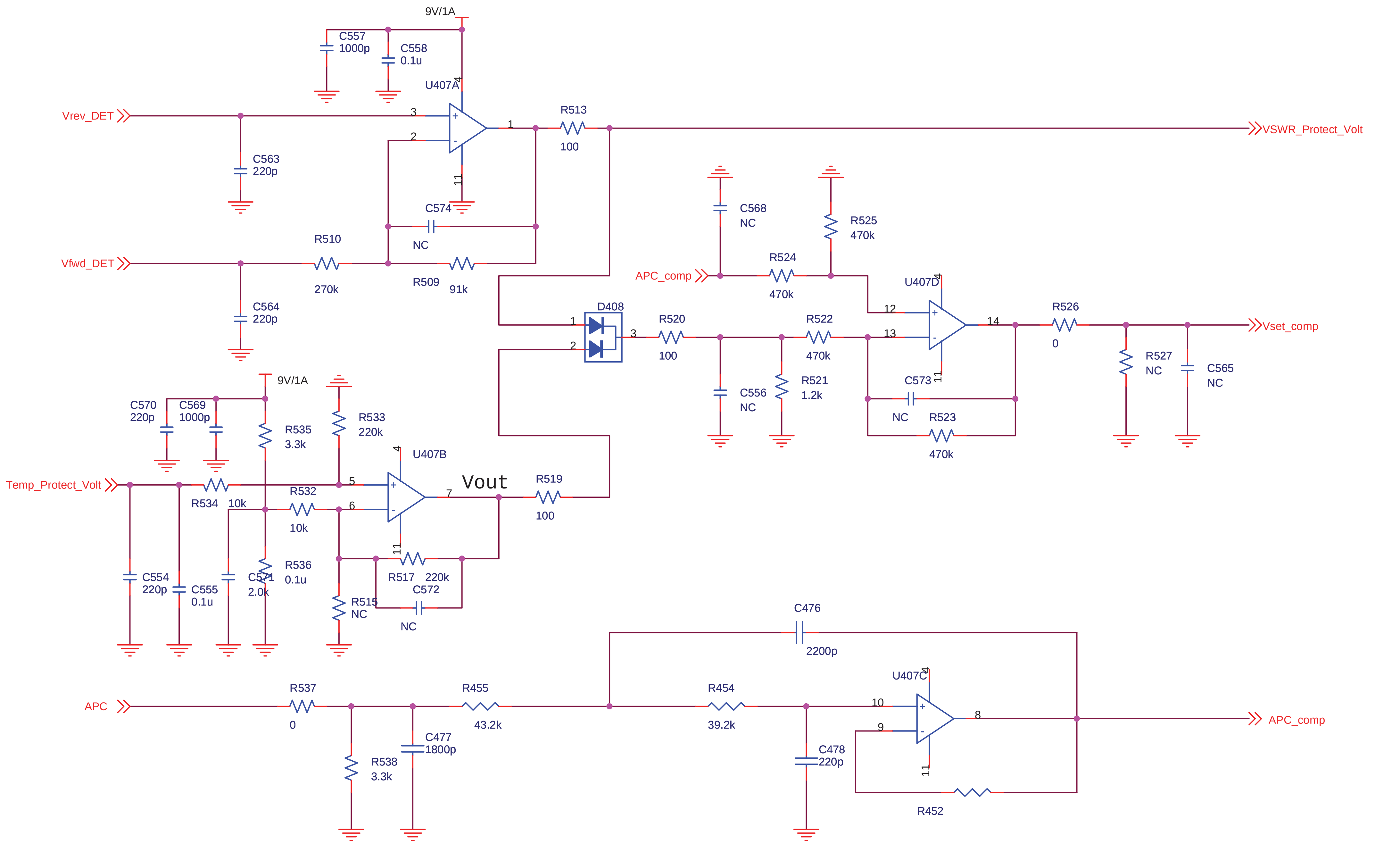
RD98X Schematic Diagram (PA Circuit)



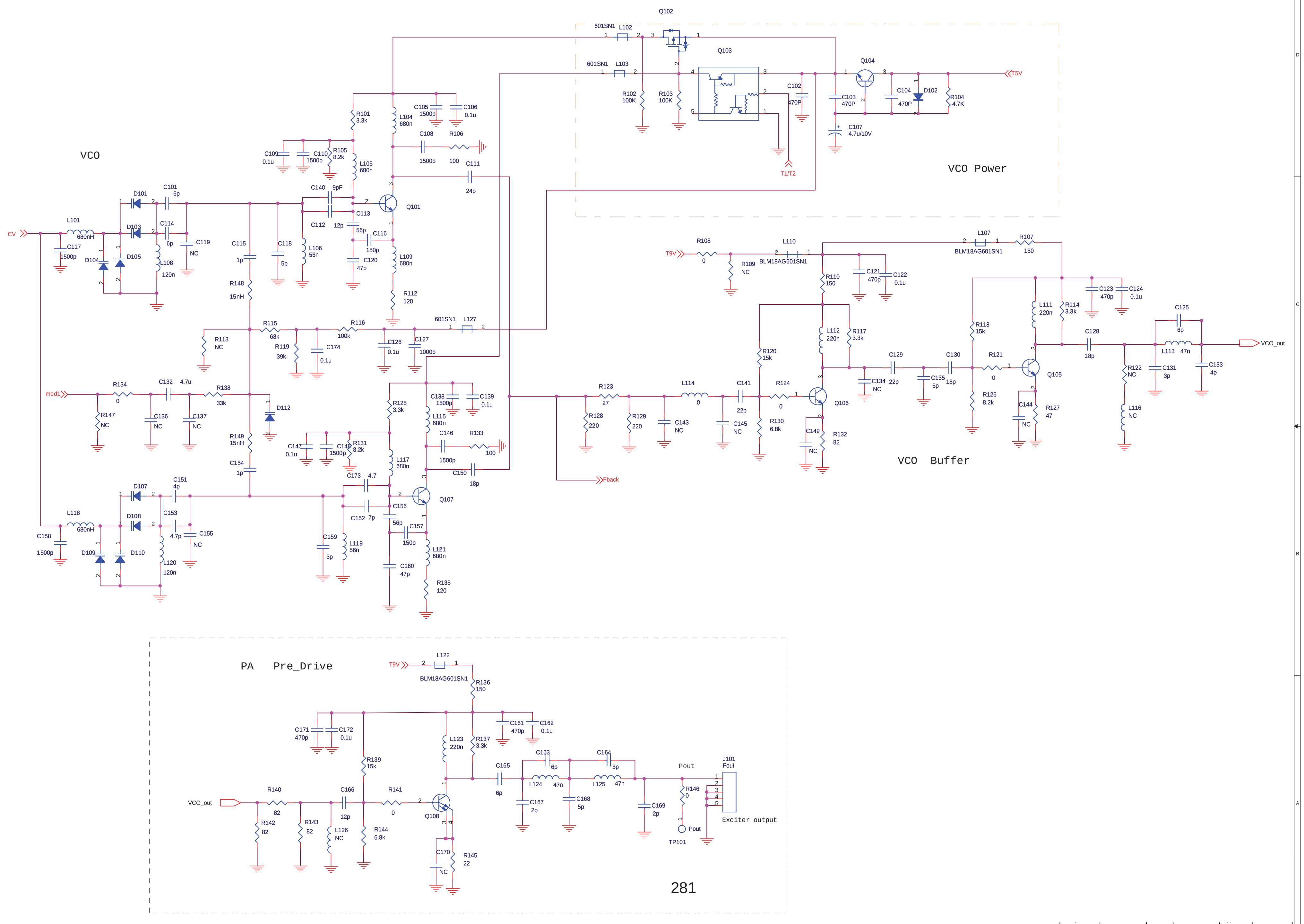
RD98X Schematic Diagram (TX_Power Supply Circuit)



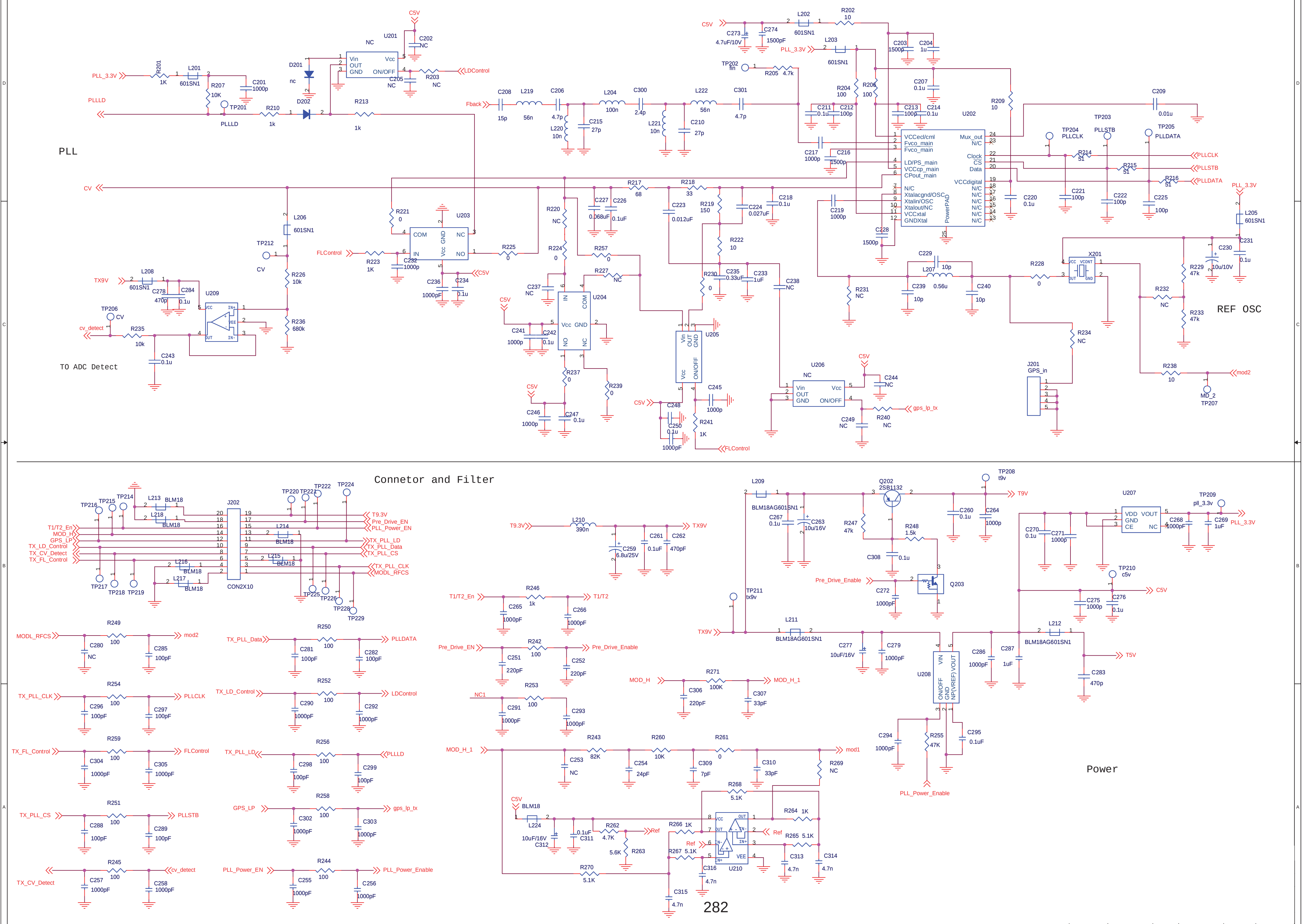
RD98X Schematic Diagram (TX_VSWR & Temperature Protection Circuit)



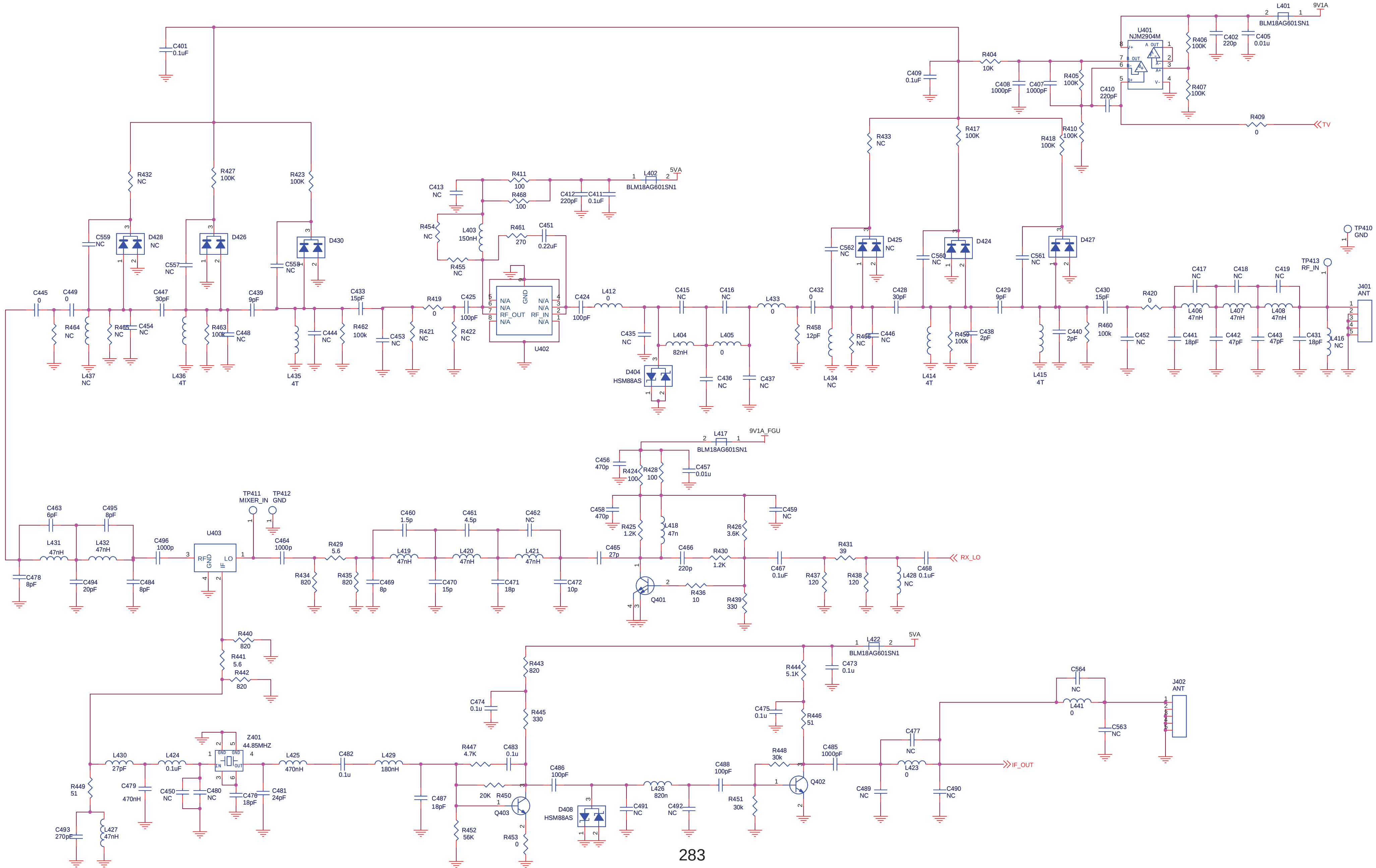
RD98X Schematic Diagram (Exciter_VCO/Buffer/ Pre_Driver Circuit)



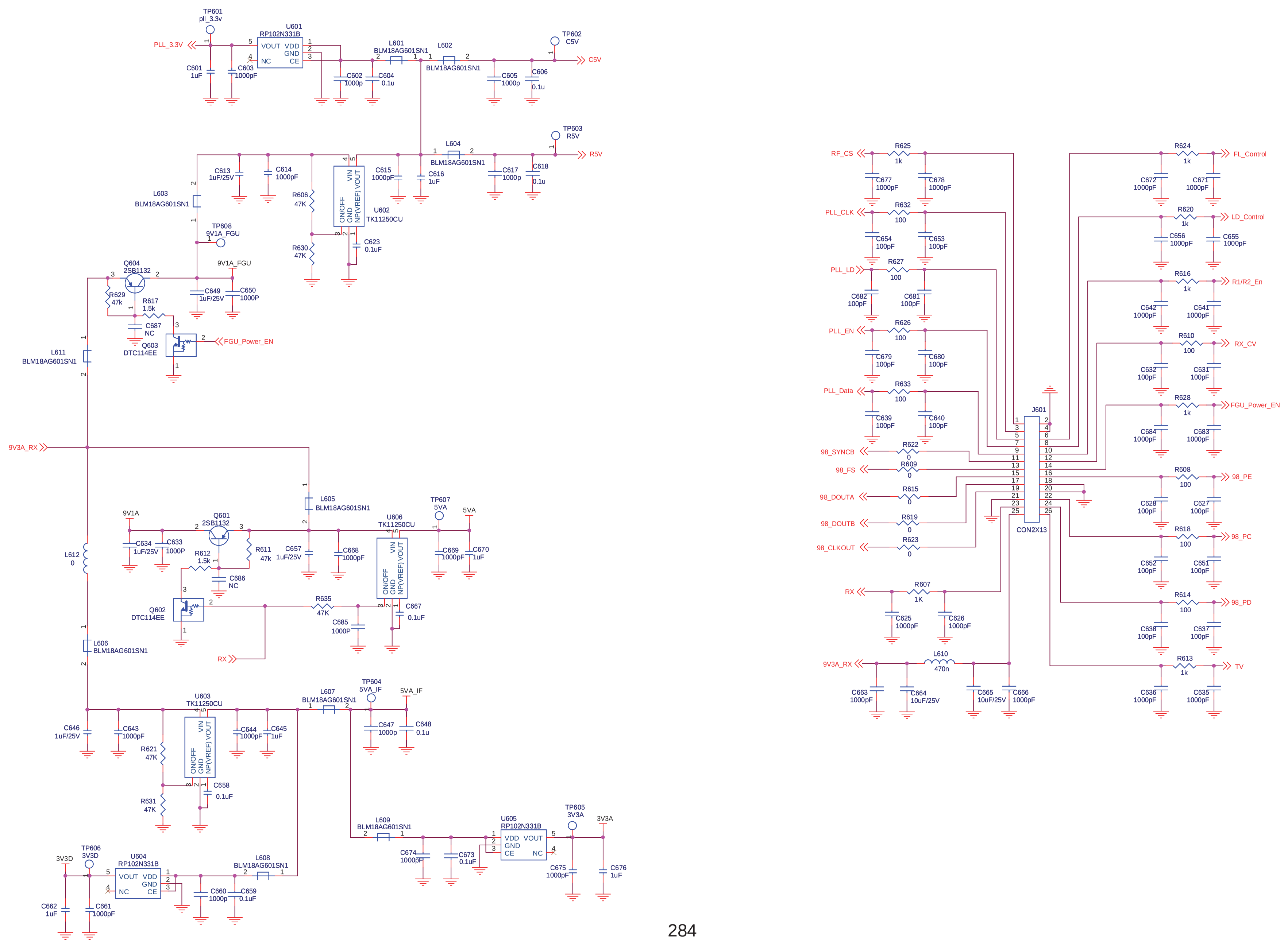
RD98X Schematic Diagram (Exciter_PLL/Power Supply/Interface Circuit)



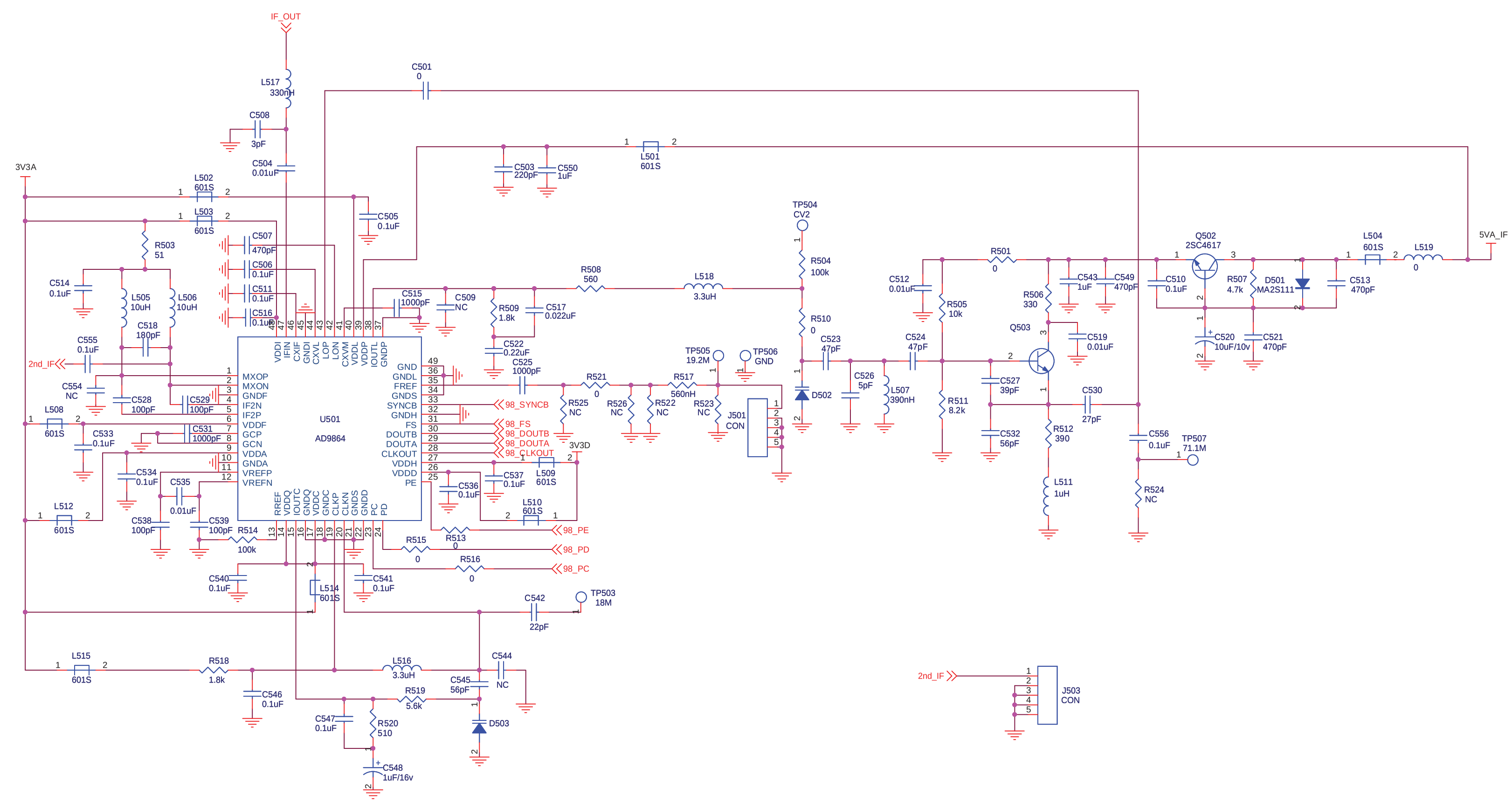
RD98X Schematic Diagram (RX_Front-end Circuit)



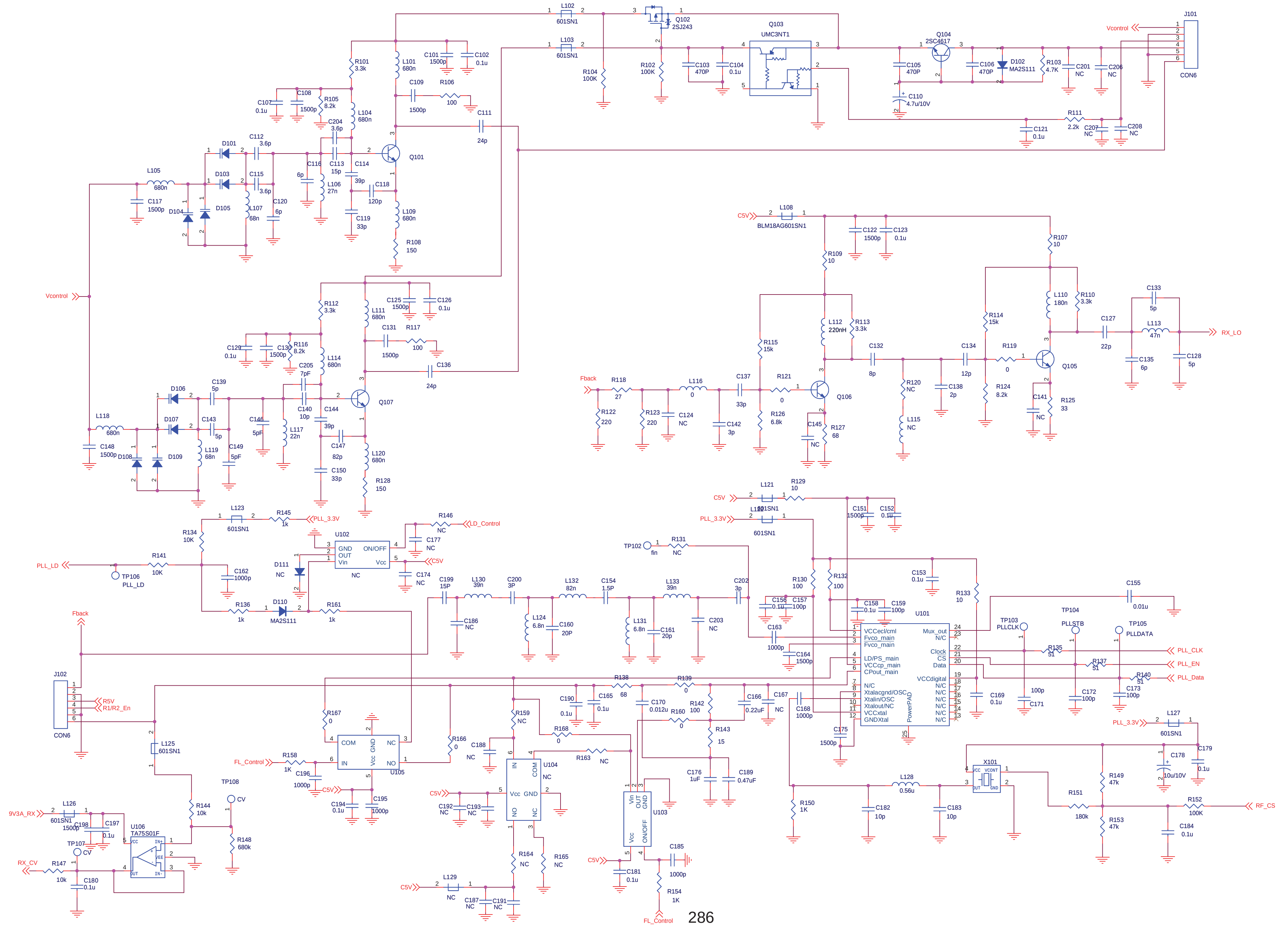
RD98X Schematic Diagram (RX_Power Supply Circuit)



RD98X Schematic Diagram (RX_AD9864 Circuit)



RD98X Schematic Diagram (RX_Frequency Synthesizer)



12.7 Parts List

Power Amplifier

No.	Ref. No.	Part No.	Description
1	R436	3001060000000	0Ω
2	R438	3001060000000	0Ω
3	R440	3001060000000	0Ω
4	R452	3001060000000	0Ω
5	R459	3001060000000	0Ω
6	R461	3001060000000	0Ω
7	R478	3001060000000	0Ω
8	R480	3001060000000	0Ω
9	R486	3001060000000	0Ω
10	R487	3001060000000	0Ω
11	R496	3001060000000	0Ω
12	R526	3001060000000	0Ω
13	R537	3001060000000	0Ω
14	R406	3001061010000	100Ω
15	R513	3001061010000	100Ω
16	R519	3001061010000	100Ω
17	R520	3001061010000	100Ω
18	R465	3001061020000	1KΩ
19	R408	3001061030000	10KΩ
20	R52	3001061030000	10KΩ
21	R532	3001061030000	10KΩ
22	R534	3001061030000	10KΩ
23	R434	3001061220000	1.2KΩ
24	R457	3001061220000	1.2KΩ
25	R521	3001061220000	1.2KΩ
26	C571	3001062020030	2KΩ
27	R484	3001062020030	2KΩ
28	R479	3001062220000	2.2KΩ
29	R517	3001062240000	220KΩ
30	R533	3001062240000	220KΩ
31	R481	3001062720030	2.7KΩ
32	R437	3001063310000	330Ω
33	R460	3001063310000	330Ω
34	R535	3001063320000	3.3KΩ
35	R538	3001063320000	3.3KΩ
36	R61	3001063620000	3.6KΩ
37	R454	3001063930000	39KΩ
38	R455	3001064730000	47KΩ
39	R485	3001064730000	47KΩ

No.	Ref. No.	Part No.	Description
40	RT401	3001064730000	47KΩ
41	R450	3001064740000	470KΩ
42	R522	3001064740000	470KΩ
43	R523	3001064740000	470KΩ
44	R524	3001064740000	470KΩ
45	R525	3001064740000	470KΩ
46	R407	3001065130000	51KΩ
47	R449	3001065620000	5.6KΩ
48	R409	3001065620010	5.6KΩ
49	R439	3001066810010	680Ω
50	R495	3001066820000	6.8KΩ
51	R435	3001068220000	8.2KΩ
52	R458	3001068220000	8.2KΩ
53	R442	3001070000000	0Ω
54	R462	3001070000000	0Ω
55	R464	3001070000000	0Ω
56	R466	3001070000000	0Ω
57	R477	3001070000000	0Ω
58	R482	3001070000000	0Ω
59	R492	3001070000000	0Ω
60	R505	3001070000000	0Ω
61	C420	3001071000000	10Ω
62	R414	3001071000000	10Ω
63	R415	3001071000000	10Ω
64	R432	3001071000000	10Ω
65	R441	3001071000000	10Ω
66	R472	3001071000000	10Ω
67	R473	3001071000000	10Ω
68	R503	3001071000000	10Ω
69	R504	3001071000000	10Ω
70	R410	3001071030000	10KΩ
71	R483	3001071040010	100KΩ
72	R501	3001071040010	100KΩ
73	C405	3001071200000	12Ω
74	R401	3001071200000	12Ω
75	R404	3001071200000	12Ω
76	R500	3001071230010	12KΩ
77	R402	3001073910000	390Ω
78	R403	3001073910000	390Ω
79	R411	3001074700000	47Ω
80	R498	3001085100000	51Ω
81	R499	3001085100000	51Ω

No.	Ref. No.	Part No.	Description
82	R489	3001074720010	4.7KΩ
83	R490	3001074720010	4.7KΩ
84	R446	3001075100000	51Ω
85	R445	3001076810000	680Ω
86	R471	3001076810000	680Ω
87	R467	3001080190000	0.1Ω
88	R468	3001080190000	0.1Ω
89	R469	3001080190000	0.1Ω
90	R470	3001080190000	0.1Ω
91	R425	3001081010000	100Ω
92	R429	3001081010000	100Ω
93	R426	3001081210000	120Ω
94	R430	3001081210000	120Ω
95	R424	3001082700000	27Ω
96	R428	3001082700000	27Ω
97	R476	3001083310010	330Ω
98	R417	3001084790000	4.7Ω
99	R418	3001084790000	4.7Ω
100	R419	3001084790000	4.7Ω
101	R421	3001084790000	4.7Ω
102	R422	3001084790000	4.7Ω
103	R423	3001084790000	4.7Ω
104	R463	3001084790000	4.7Ω
105	R502	3001161000010	10Ω
106	R475	3001161510010	150Ω
107	C485	3101061010010	100PF
108	C519	3101061010010	100PF
109	C538	3101061010010	100PF
110	C539	3101061010010	100PF
111	C502	3101061020000	1000PF
112	C504	3101061020000	1000PF
113	C529	3101061020000	1000PF
114	C552	3101061020000	1000PF
115	C557	3101061020000	1000PF
116	C566	3101061020000	1000PF
117	C567	3101061020000	1000PF
118	C569	3101061020000	1000PF
119	C505	3101061030010	0.01UF
120	C520	3101061030010	0.01UF
121	C523	3101061030010	0.01UF
122	C474	3101061040010	0.1UF
123	C484	3101061040010	0.1UF

No.	Ref. No.	Part No.	Description
124	C488	3101061040010	0.1UF
125	C503	3101061040010	0.1UF
126	C514	3101061040010	0.1UF
127	C518	3101061040010	0.1UF
128	C526	3101061040010	0.1UF
129	C530	3101061040010	0.1UF
130	C555	3101061040010	0.1UF
131	C558	3101061040010	0.1UF
132	C560	3101061040010	0.1UF
133	R536	3101061040010	0.1UF
134	C531	3101061050000	1UF
135	C477	3101061820000	1800PF
136	C413	3101062210000	220PF
137	C478	3101062210000	220PF
138	C489	3101062210000	220PF
139	C501	3101062210000	220PF
140	C527	3101062210000	220PF
141	C554	3101062210000	220PF
142	C559	3101062210000	220PF
143	C563	3101062210000	220PF
144	C564	3101062210000	220PF
145	C570	3101062210000	220PF
146	C476	3101062220010	2200PF
147	C482	3101063920000	3900PF
148	C549	3101064720000	4700PF
149	C535	3101064740000	0.47UF
150	C537	3101064740000	0.47UF
151	C550	3101065610000	560PF
152	C543	3101066810020	680PF
153	C471	3101070600010	6PF
154	C506	3101070600010	6PF
155	R443	3101070600010	6PF
156	C414	3101071010000	100PF
157	C417	3101071010000	100PF
158	C492	3101071010000	100PF
159	C517	3101071010000	100PF
160	C540	3101071010000	100PF
161	C545	3101071010000	100PF
162	C401	3101071020010	1000PF
163	C410	3101071020010	1000PF
164	C415	3101071020010	1000PF
165	C416	3101071020010	1000PF

No.	Ref. No.	Part No.	Description
166	C419	3101071020010	1000PF
167	C472	3101071020010	1000PF
168	C486	3101071020010	1000PF
169	C495	3101071020010	1000PF
170	C497	3101071020010	1000PF
171	C500	3101071020010	1000PF
172	C525	3101071020010	1000PF
173	C547	3101071020010	1000PF
174	C508	3101071030010	0.01UF
175	C553	3101071030010	0.01UF
176	C473	3101071040000	0.1UF
177	C494	3101071040000	0.1UF
178	C496	3101071040000	0.1UF
179	C516	3101071040000	0.1UF
180	C522	3101071040000	0.1UF
181	C524	3101071040000	0.1UF
182	C544	3101071040000	0.1UF
183	C533	3101071050160	1UF
184	C418	3101072210010	220PF
185	C483	3101072210010	220PF
186	C498	3101072210010	220PF
187	C499	3101072210010	220PF
188	C532	3101072210010	220PF
189	C548	3101072210010	220PF
190	C534	3101072220010	2200PF
191	C490	3101081020010	1000pF
192	C491	3101081040010	0.1UF
193	C455	3101370200000	2pF
194	C457	3101370200000	2pF
195	C462	3101371000000	10pF
196	C463	3101371000000	10pF
197	C36	3101372200000	22pF
198	C441	3101372200000	22pF
199	C442	3101372200000	22pF
200	C443	3101372200000	22pF
201	C454	3101372200000	22pF
202	C430	3101374710000	470pF
203	C431	3101374710000	470pF
204	C467	3101374710000	470pF
205	C575	3101374710000	470pF
206	C453	3101376890000	6.8pF
207	C458	3101376890000	6.8pF

No.	Ref. No.	Part No.	Description
208	C76	3101376890000	6.8pF
209	C542	3101378290000	8.2pF
210	C528	3104086840020	0.68UF
211	C521	3104086850030	6.8UF
212	C551	3104086850030	6.8UF
213	C546	3104993360000	33uF
214	C515	3104994750020	4.7uF
215	C536	3104994750020	4.7uF
216	R493	3210306560000	56nH
217	R494	3210306560000	56nH
218	R497	3210306560000	56nH
219	R528	3210306560000	56nH
220	R529	3210306560000	56nH
221	L417	3213306102000	1uH
222	L418	3213306102000	1uH
223	L407	3215107470000	47nH
224	L401	3217107180010	18nH
225	L15	3231083011000	113nH
226	L416	3231083011000	113nH
227	L402	3217112102020	1uH
228	L420	3221507600000	Ferrite bead
229	L421	3221507600000	Ferrite bead
230	L403	3221513600000	Ferrite bead
231	L419	3221513600000	Ferrite bead
232	L422	3221513600000	Ferrite bead
233	L423	3221513600000	Ferrite bead
234	L424	3221513600000	Ferrite bead
235	L426	3221513600000	Ferrite bead
236	L427	3221513600000	Ferrite bead
237	L428	3221513600000	Ferrite bead
238	L433	3221513600000	Ferrite bead
239	L404	3231351680000	16nH
240	L410	3233099400010	40nH
241	L412	3233099400010	40nH
242	L413	3233099400010	40nH
243	L414	3233099400010	40nH
244	D406	3302030500030	Zener diode
245	D404	3302060000000	Zener diode
246	D405	3303010500040	Switching diode
247	D407	3303010500290	Switching diode
248	D408	3303030100010	Switching diode
249	Q408	3403008000010	Transistor

No.	Ref. No.	Part No.	Description
250	Q409	3403008000010	Transistor
251	Q401	3504990000010	PA IC
252	Q402	3504990000020	PA IC
253	U406	3605008001690	Operational amplifier
254	U401	3605008005070	Operational amplifier
255	U407	3605010000020	Operational amplifier
256	U404	3608002005490	Power management IC
257	U405	3608015000060	Power management IC
258	D401	3609030000000	Schottky diode
259	D402	3609030000000	Schottky diode
260	U403	3623025000000	Wave detector IC
261	R510	3001062740010	270KΩ
262	R509	3001069130000	91KΩ
263	C470	3001071510010	150Ω
264	R444	3001071810000	180Ω
265	C452	3101371200000	12pF
266	C456	3101371200000	12pF
267	C459	3101371200000	12pF
268	C465	3101373990000	3.9pF
269	C466	3101373990000	3.9pF
270	R433	3217107471010	470nH
271	R456	3217107471010	470nH
272	L409	3233099220000	22nH
273	L408	3233099185900	18.5nH
274	L411	3233099185900	18.5nH
275	C404	3101066800000	68PF
276	C425	3101073000000	30PF
277	C427	3101073000000	30PF
278	C424	3101073300000	33PF
279	C426	3101073300000	33PF
280	C403	3101074700000	47PF
281	C464	3101370100000	1pF
282	C448	3101371210000	120pF
283	C61	3101375690000	5.6pF
284	C444	3101378200000	82PF
285	Q407	3404999000020	NPNTransistor
286			PCB
287	E1	6201868000000	Heat sink
288	E3	6202011000000	Shielding mask

Exciter Board

No.	Ref. No.	Part No.	Description
1	R224	3001050000000	0Ω
2	R228	3001050000000	0Ω
3	L114	3001060000000	0Ω
4	R108	3001060000000	0Ω
5	R121	3001060000000	0Ω
6	R124	3001060000000	0Ω
7	R134	3001060000000	0Ω
8	R141	3001060000000	0Ω
9	R146	3001060000000	0Ω
10	R221	3001060000000	0Ω
11	R225	3001060000000	0Ω
12	R230	3001060000000	0Ω
13	R237	3001060000000	0Ω
14	R239	3001060000000	0Ω
15	R257	3001060000000	0Ω
16	R261	3001060000000	0Ω
17	R202	3001051000000	10Ω
18	R209	3001051000000	10Ω
19	R238	3001051000000	10Ω
20	R222	3001061000000	10Ω
21	R145	3001062200000	22Ω
22	R123	3001062700000	27Ω
23	R218	3001063300000	33Ω
24	R127	3001064700000	47Ω
25	R214	3001055100020	51Ω
26	R215	3001055100020	51Ω
27	R216	3001055100020	51Ω
28	R217	3001066800000	68Ω
29	R132	3001068200000	82Ω
30	R140	3001068200000	82Ω
31	R142	3001068200000	82Ω
32	R143	3001068200000	82Ω
33	R204	3001051010000	100Ω
34	R206	3001051010000	100Ω
35	R106	3001061010000	100Ω
36	R133	3001061010000	100Ω
37	R242	3001061010000	100Ω
38	R244	3001061010000	100Ω
39	R245	3001061010000	100Ω
40	R249	3001061010000	100Ω
41	R250	3001061010000	100Ω

No.	Ref. No.	Part No.	Description
42	R251	3001061010000	100Ω
43	R252	3001061010000	100Ω
44	R253	3001061010000	100Ω
45	R254	3001061010000	100Ω
46	R256	3001061010000	100Ω
47	R258	3001061010000	100Ω
48	R259	3001061010000	100Ω
49	R112	3001061210000	120Ω
50	R135	3001061210000	120Ω
51	R107	3001061510000	150Ω
52	R110	3001061510000	150Ω
53	R136	3001061510000	150Ω
54	R219	3001061510000	150Ω
55	R128	3001062210000	220Ω
56	R129	3001062210000	220Ω
57	R201	3001051020000	1KΩ
58	R210	3001051020000	1KΩ
59	R213	3001051020000	1KΩ
60	R223	3001051020000	1KΩ
61	R241	3001051020000	1KΩ
62	R246	3001061020010	1KΩ
63	R264	3001061020010	1KΩ
64	R266	3001061020010	1KΩ
65	R248	3001061520000	1.5KΩ
66	R101	3001063320000	3.3KΩ
67	R114	3001063320000	3.3KΩ
68	R117	3001063320000	3.3KΩ
69	R125	3001063320000	3.3KΩ
70	R137	3001063320000	3.3KΩ
71	R104	3001054720000	4.7KΩ
72	R205	3001054720000	4.7KΩ
73	R262	3001064720000	4.7KΩ
74	R265	3001065120000	5.1KΩ
75	R267	3001065120000	5.1KΩ
76	R268	3001065120000	5.1KΩ
77	R263	3001065620000	5.6KΩ
78	R130	3001066820000	6.8KΩ
79	R144	3001066820000	6.8KΩ
80	R105	3001068220000	8.2KΩ
81	R126	3001068220000	8.2KΩ
82	R131	3001068220000	8.2KΩ
83	R207	3001051030000	10KΩ

No.	Ref. No.	Part No.	Description
84	R226	3001051030000	10KΩ
85	R235	3001051030000	10KΩ
86	R260	3001061030010	10KΩ
87	R118	3001061530010	15KΩ
88	R120	3001061530010	15KΩ
89	R139	3001061530010	15KΩ
90	R138	3001063330000	33KΩ
91	R119	3001063930010	39KΩ
92	R229	3001054730010	47KΩ
93	R233	3001054730010	47KΩ
94	R247	3001064730000	47KΩ
95	R255	3001064730000	47KΩ
96	R115	3001066830000	68KΩ
97	R243	3001068230010	82KΩ
98	R102	3001051040000	100KΩ
99	R103	3001051040000	100KΩ
100	R116	3001061040000	100KΩ
101	R271	3001061040000	100KΩ
102	R236	3001066840000	680KΩ
103	C115	3101060100010	1PF
104	C154	3101060100010	1PF
105	C167	3101060200010	2PF
106	C169	3101060200010	2PF
107	C300	3101052490010	2.4PF
108	C131	3101060300010	3PF
109	C159	3101060300010	3PF
110	C133	3101060400010	4PF
111	C151	3101060400010	4PF
112	C206	3101054790040	4.7PF
113	C301	3101054790040	4.7PF
114	C153	3101064790010	4.7PF
115	C173	3101064790010	4.7PF
116	C118	3101060500010	5PF
117	C135	3101060500010	5PF
118	C164	3101060500010	5PF
119	C168	3101060500010	5PF
120	C101	3101060600010	6PF
121	C114	3101060600010	6PF
122	C125	3101060600010	6PF
123	C163	3101060600010	6PF
124	C165	3101060600010	6PF
125	C152	3101060700020	7PF

No.	Ref. No.	Part No.	Description
126	C309	3101060700020	7PF
127	C140	3101060900010	9PF
128	C229	3101061000000	10PF
129	C239	3101061000000	10PF
130	C240	3101061000000	10PF
131	C112	3101061200000	12PF
132	C166	3101061200000	12PF
133	C208	3101051500020	15PF
134	C128	3101061800000	18PF
135	C130	3101061800000	18PF
136	C150	3101061800000	18PF
137	C129	3101062200010	22PF
138	C141	3101062200010	22PF
139	C111	3101062400010	24PF
140	C254	3101062400010	24PF
141	C210	3101062700010	27PF
142	C215	3101062700010	27PF
143	C307	3101063300000	33PF
144	C120	3101064700000	47PF
145	C160	3101064700000	47PF
146	C113	3101065600000	56PF
147	C156	3101065600000	56PF
148	C212	3101051010030	100PF
149	C213	3101051010030	100PF
150	C221	3101051010030	100PF
151	C222	3101051010030	100PF
152	C225	3101051010030	100PF
153	C281	3101061010010	100PF
154	C282	3101061010010	100PF
155	C285	3101061010010	100PF
156	C288	3101061010010	100PF
157	C289	3101061010010	100PF
158	C296	3101061010010	100PF
159	C297	3101061010010	100PF
160	C298	3101061010010	100PF
161	C299	3101061010010	100PF
162	C116	3101061510000	150PF
163	C157	3101061510000	150PF
164	C251	3101062210000	220PF
165	C252	3101062210000	220PF
166	C306	3101062210000	220PF
167	C102	3101054710010	470PF

No.	Ref. No.	Part No.	Description
168	C103	3101054710010	470PF
169	C104	3101054710010	470PF
170	C278	3101054710010	470PF
171	C283	3101054710010	470PF
172	C121	3101064710000	470PF
173	C123	3101064710000	470PF
174	C161	3101064710000	470PF
175	C171	3101064710000	470PF
176	C262	3101064710000	470PF
177	C201	3101051020010	1000PF
178	C217	3101051020010	1000PF
179	C219	3101051020010	1000PF
180	C232	3101051020010	1000PF
181	C236	3101051020010	1000PF
182	C241	3101051020010	1000PF
183	C245	3101051020010	1000PF
184	C246	3101051020010	1000PF
185	C250	3101051020010	1000PF
186	C127	3101061020000	1000PF
187	C255	3101061020000	1000PF
188	C256	3101061020000	1000PF
189	C257	3101061020000	1000PF
190	C258	3101061020000	1000PF
191	C264	3101061020000	1000PF
192	C265	3101061020000	1000PF
193	C266	3101061020000	1000PF
194	C268	3101061020000	1000PF
195	C271	3101061020000	1000PF
196	C272	3101061020000	1000PF
197	C275	3101061020000	1000PF
198	C279	3101061020000	1000PF
199	C286	3101061020000	1000PF
200	C290	3101061020000	1000PF
201	C291	3101061020000	1000PF
202	C292	3101061020000	1000PF
203	C293	3101061020000	1000PF
204	C294	3101061020000	1000PF
205	C302	3101061020000	1000PF
206	C303	3101061020000	1000PF
207	C304	3101061020000	1000PF
208	C305	3101061020000	1000PF
209	C203	3101051520000	1500PF

No.	Ref. No.	Part No.	Description
210	C216	3101051520000	1500PF
211	C228	3101051520000	1500PF
212	C105	3101061520010	1500PF
213	C108	3101061520010	1500PF
214	C110	3101061520010	1500PF
215	C117	3101061520010	1500PF
216	C138	3101061520010	1500PF
217	C146	3101061520010	1500PF
218	C148	3101061520010	1500PF
219	C158	3101061520010	1500PF
220	C274	3101061520010	1500PF
221	C209	3101051030020	0.01UF
222	C223	3101061230000	0.012UF
223	C224	3101062730000	0.027UF
224	C227	3101066830000	0.068UF
225	C207	3101051040010	0.1UF
226	C211	3101051040010	0.1UF
227	C214	3101051040010	0.1UF
228	C220	3101051040010	0.1UF
229	C231	3101051040010	0.1UF
230	C234	3101051040010	0.1UF
231	C242	3101051040010	0.1UF
232	C243	3101051040010	0.1UF
233	C247	3101051040010	0.1UF
234	C248	3101051040010	0.1UF
235	C267	3101051040010	0.1UF
236	C284	3101051040010	0.1UF
237	C106	3101061040020	0.1UF
238	C109	3101061040020	0.1UF
239	C122	3101061040020	0.1UF
240	C124	3101061040020	0.1UF
241	C126	3101061040020	0.1UF
242	C139	3101061040020	0.1UF
243	C147	3101061040020	0.1UF
244	C162	3101061040020	0.1UF
245	C172	3101061040020	0.1UF
246	C174	3101061040020	0.1UF
247	C226	3101061040020	0.1UF
248	C260	3101061040020	0.1UF
249	C261	3101061040020	0.1UF
250	C270	3101061040020	0.1UF
251	C276	3101061040020	0.1UF

No.	Ref. No.	Part No.	Description
252	C295	3101061040020	0.1UF
253	C308	3101061040020	0.1UF
254	C311	3101061040020	0.1UF
255	C235	3101073340010	0.33UF
256	C204	3101051050160	1uF
257	C233	3101071050020	1UF
258	C269	3101061050020	1UF
259	C287	3101061050020	1UF
260	C132	3101074750000	4.7UF
261	C107	3104074750070	4.7UF
262	C273	3104074750070	4.7UF
263	C259	3104086850030	6.8UF
264	C230	3104071060070	10UF
265	C263	3104081060120	10UF
266	C277	3104081060120	10UF
267	C312	3104081060120	10UF
268	C313	3217106479000	4.7nH
269	C314	3217106479000	4.7nH
270	C315	3217106479000	4.7nH
271	C316	3217106479000	4.7nH
272	L220	3215006100010	10nH
273	L221	3215006100010	10nH
274	R148	3210306220000	22nH
275	R149	3210306220000	22nH
276	L113	3217106470000	47nH
277	L124	3217106470000	48nH
278	L125	3217106470000	49nH
279	L219	3210306560000	56nH
280	L222	3210306560000	57nH
281	L204	3210306101000	100nH
282	L108	3217107121000	120nH
283	L120	3217107121000	120nH
284	L111	3212106221000	220nH
285	L112	3212106221000	220nH
286	L123	3212106221000	220nH
287	L210	3217607391000	390nH
288	L101	3217607681000	680nH
289	L104	3217607681000	680nH
290	L105	3217607681000	680nH
291	L109	3217607681000	680nH
292	L115	3217607681000	680nH
293	L117	3217607681000	680nH

No.	Ref. No.	Part No.	Description
294	L118	3217607681000	680nH
295	L121	3217607681000	680nH
296	L207	3213306561000	0.56uH
297	L102	3221506601000	Ferrite bead
298	L103	3221506601000	Ferrite bead
299	L107	3221506601000	Ferrite bead
300	L110	3221506601000	Ferrite bead
301	L122	3221506601000	Ferrite bead
302	L127	3221506601000	Ferrite bead
303	L201	3221506601000	Ferrite bead
304	L202	3221506601000	Ferrite bead
305	L203	3221506601000	Ferrite bead
306	L205	3221506601000	Ferrite bead
307	L206	3221506601000	Ferrite bead
308	L208	3221506601000	Ferrite bead
309	L209	3221506601000	Ferrite bead
310	L211	3221506601000	Ferrite bead
311	L212	3221506601000	Ferrite bead
312	L213	3221506601000	Ferrite bead
313	L214	3221506601000	Ferrite bead
314	L215	3221506601000	Ferrite bead
315	L216	3221506601000	Ferrite bead
316	L217	3221506601000	Ferrite bead
317	L218	3221506601000	Ferrite bead
318	L106	3211256000000	56nH
319	L119	3211256000000	56nH
320	D101	3304060300050	Varactor
321	D103	3304060300050	Varactor
322	D104	3304060300050	Varactor
323	D105	3304060300050	Varactor
324	D107	3304060300050	Varactor
325	D108	3304060300050	Varactor
326	D109	3304060300050	Varactor
327	D110	3304060300050	Varactor
328	D102	3303240000000	Varactor
329	D202	3303240000000	Varactor
330	D112	3304010100890	Varactor
331	Q101	3408002000080	NPN transistor
332	Q107	3408002000080	NPN transistor
333	Q105	3404006000000	NPN transistor
334	Q106	3404006000000	NPN transistor
335	Q108	3404999000000	NPN transistor

No.	Ref. No.	Part No.	Description
336	Q103	3499000000150	Composite transistor
337	Q104	3403003000060	NPN transistor
338	Q202	3403002000000	PNP transistor
339	Q203	3403008000010	Bias resistor transistor
340	Q102	3503010000010	P-MOSFET
341	U202	3604019000000	PLL IC
342	U203	3616010000000	Switch IC
343	U204	3616010000000	Switch IC
344	U205	3616059000000	Switch IC
345	U207	3608006000000	Power management IC
346	U208	3608020000000	Power management IC
347	U209	3605002057090	Operational amplifier
348	U210	3605002054590	Operational amplifier
349	X201	3701019250060	Temperature compensated crystal oscillator

Receiver Board

No.	Ref. No.	Part No.	Description
1	C501	3001050000000	0Ω
2	R141	3001050000000	0Ω
3	R160	3001050000000	0Ω
4	R166	3001050000000	0Ω
5	R167	3001050000000	0Ω
6	R168	3001050000000	0Ω
7	R501	3001050000000	0Ω
8	R510	3001050000000	0Ω
9	R513	3001050000000	0Ω
10	R515	3001050000000	0Ω
11	R516	3001050000000	0Ω
12	R129	3001051000000	10Ω
13	R133	3001051000000	10Ω
14	R130	3001051010000	100Ω
15	R132	3001051010000	100Ω
16	R136	3001051020000	1KΩ
17	R145	3001051020000	1KΩ
18	R150	3001051020000	1KΩ
19	R154	3001051020000	1KΩ
20	R158	3001051020000	1KΩ
21	R161	3001051020000	1KΩ
22	R134	3001051030000	10KΩ
23	R144	3001051030000	10KΩ
24	R147	3001051030000	10KΩ
25	R505	3001051030000	10KΩ
26	R152	3001051040000	100KΩ
27	R504	3001051040000	100KΩ
28	R514	3001051040000	100KΩ
29	R509	3001051820000	1.8KΩ
30	R518	3001051820000	1.8KΩ
31	R151	3001051840000	180KΩ
32	R111	3001052220000	2.2KΩ
33	R507	3001054720000	4.7KΩ
34	R149	3001054730000	47KΩ
35	R153	3001054730000	47KΩ
36	R135	3001055100020	51Ω
37	R137	3001055100020	51Ω
38	R140	3001055100020	51Ω
39	R503	3001055100020	51Ω
40	R520	3001055110000	510Ω
41	R519	3001055620000	5.6KΩ

No.	Ref. No.	Part No.	Description
42	R511	3001058220000	8.2KΩ
43	C432	3001060000000	0Ω
44	C445	3001060000000	0Ω
45	C449	3001060000000	0Ω
46	L116	3001060000000	0Ω
47	L405	3001060000000	0Ω
48	L412	3001060000000	0Ω
49	L423	3001060000000	0Ω
50	L433	3001060000000	0Ω
51	L519	3001060000000	0Ω
52	L612	3001060000000	0Ω
53	R119	3001060000000	0Ω
54	R121	3001060000000	0Ω
55	R139	3001060000000	0Ω
56	R409	3001060000000	0Ω
57	R419	3001060000000	0Ω
58	R420	3001060000000	0Ω
59	R453	3001060000000	0Ω
60	R521	3001060000000	0Ω
61	R609	3001060000000	0Ω
62	R615	3001060000000	0Ω
63	R619	3001060000000	0Ω
64	R622	3001060000000	0Ω
65	R623	3001060000000	0Ω
66	R107	3001061000000	10Ω
67	R109	3001061000000	10Ω
68	R436	3001061000000	10Ω
69	R106	3001061010000	100Ω
70	R117	3001061010000	100Ω
71	R142	3001061010000	100Ω
72	R608	3001061010000	100Ω
73	R610	3001061010000	100Ω
74	R614	3001061010000	100Ω
75	R618	3001061010000	100Ω
76	R626	3001061010000	100Ω
77	R627	3001061010000	100Ω
78	R632	3001061010000	100Ω
79	R633	3001061010000	100Ω
80	R411	3001071010000	100Ω
81	R424	3001071010000	100Ω
82	R428	3001071010000	100Ω
83	R468	3001071010000	100Ω

No.	Ref. No.	Part No.	Description
84	R607	3001061020010	1KΩ
85	R613	3001061020010	1KΩ
86	R616	3001061020010	1KΩ
87	R620	3001061020010	1KΩ
88	R624	3001061020010	1KΩ
89	R625	3001061020010	1KΩ
90	R628	3001061020010	1KΩ
91	R404	3001061030010	10KΩ
92	R102	3001061040010	100KΩ
93	R104	3001061040010	100KΩ
94	R405	3001061040010	100KΩ
95	R406	3001061040010	100KΩ
96	R407	3001061040010	100KΩ
97	R410	3001061040010	100KΩ
98	R417	3001061040010	100KΩ
99	R418	3001061040010	100KΩ
100	R423	3001061040010	100KΩ
101	R427	3001061040010	100KΩ
102	R459	3001061040010	100KΩ
103	R460	3001061040010	100KΩ
104	R462	3001061040010	100KΩ
105	R463	3001061040010	100KΩ
106	R437	3001061210000	120Ω
107	R438	3001061210000	120Ω
108	R425	3001061220000	1.2KΩ
109	R430	3001061220000	1.2KΩ
110	R143	3001061500000	15Ω
111	R108	3001061510000	150Ω
112	R128	3001061510000	150Ω
113	R612	3001061520000	1.5KΩ
114	R617	3001061520000	1.5KΩ
115	R114	3001061530010	15KΩ
116	R115	3001061530010	15KΩ
117	R450	3001062030000	20KΩ
118	R122	3001062210000	220Ω
119	R123	3001062210000	220Ω
120	R118	3001062700000	27Ω
121	R448	3001063030000	30KΩ
122	R451	3001063030000	30KΩ
123	R125	3001063300000	33Ω
124	R439	3001063310010	330Ω
125	R445	3001063310010	330Ω

No.	Ref. No.	Part No.	Description
126	R101	3001063320000	3.3KΩ
127	R110	3001063320000	3.3KΩ
128	R112	3001063320000	3.3KΩ
129	R113	3001063320000	3.3KΩ
130	R426	3001063620000	3.6KΩ
131	R103	3001064720000	4.7KΩ
132	R447	3001064720000	4.7KΩ
133	R606	3001064730000	47KΩ
134	R611	3001064730000	47KΩ
135	R621	3001064730000	47KΩ
136	R629	3001064730000	47KΩ
137	R630	3001064730000	47KΩ
138	R631	3001064730000	47KΩ
139	R635	3001064730000	47KΩ
140	R446	3001065100000	51Ω
141	R449	3001065100000	51Ω
142	R444	3001065120000	5.1KΩ
143	R452	3001065630000	56KΩ
144	R429	3001065690000	5.6Ω
145	R441	3001065690000	5.6Ω
146	R127	3001066800000	68Ω
147	R138	3001066800000	68Ω
148	R126	3001066820000	6.8KΩ
149	R434	3001068210010	820Ω
150	R435	3001068210010	820Ω
151	R440	3001068210010	820Ω
152	R442	3001068210010	820Ω
153	R443	3001068210010	820Ω
154	R105	3001068220000	8.2KΩ
155	R116	3001068220000	8.2KΩ
156	R124	3001068220000	8.2KΩ
157	R506	3001053310000	330Ω
158	R508	3001055610000	560Ω
159	R512	3001053910010	390Ω
160	R148	3001056840000	680KΩ
161	R461	3001062710000	270Ω
162	R431	3001063900000	39Ω
163	C526	3101050500010	5PF
164	C530	3101052700000	27PF
165	C429	3101060900010	9PF
166	C439	3101060900010	9PF
167	C118	3101061210000	120PF

No.	Ref. No.	Part No.	Description
168	C182	3101051000020	10PF
169	C183	3101051000020	10PF
170	C157	3101051010030	100PF
171	C159	3101051010030	100PF
172	C164	3101051010030	100PF
173	C171	3101051010030	100PF
174	C172	3101051010030	100PF
175	C173	3101051010030	100PF
176	C175	3101051010030	100PF
177	C528	3101051010030	100PF
178	C529	3101051010030	100PF
179	C538	3101051010030	100PF
180	C539	3101051010030	100PF
181	C162	3101051020010	1000PF
182	C163	3101051020010	1000PF
183	C168	3101051020010	1000PF
184	C185	3101051020010	1000PF
185	C195	3101051020010	1000PF
186	C196	3101051020010	1000PF
187	C515	3101051020010	1000PF
188	C525	3101051020010	1000PF
189	C531	3101051020010	1000PF
190	C155	3101051030020	0.01UF
191	C504	3101051030020	0.01UF
192	C519	3101051030020	0.01UF
193	C535	3101051030020	0.01UF
194	C121	3101051040010	0.1UF
195	C556	3101051040010	0.1UF
196	C152	3101051040060	0.1UF
197	C153	3101051040010	0.1UF
198	C156	3101051040010	0.1UF
199	C158	3101051040010	0.1UF
200	C169	3101051040010	0.1UF
201	C179	3101051040010	0.1UF
202	C180	3101051040010	0.1UF
203	C181	3101051040010	0.1UF
204	C184	3101051040010	0.1UF
205	C194	3101051040010	0.1UF
206	C505	3101051040010	0.1UF
207	C506	3101051040010	0.1UF
208	C510	3101051040010	0.1UF
209	C511	3101051040010	0.1UF

No.	Ref. No.	Part No.	Description
210	C514	3101051040010	0.1UF
211	C516	3101051040010	0.1UF
212	C533	3101051040010	0.1UF
213	C534	3101051040010	0.1UF
214	C536	3101051040010	0.1UF
215	C537	3101051040010	0.1UF
216	C540	3101051040010	0.1UF
217	C541	3101051040010	0.1UF
218	C546	3101051040010	0.1UF
219	C547	3101051040010	0.1UF
220	C543	3101051050160	1uF
221	C550	3101051050160	1uF
222	C518	3101051810020	180PF
223	C542	3101052200010	22PF
224	C503	3101052210020	220PF
225	C527	3101053900000	39PF
226	C523	3101054700010	47PF
227	C524	3101054700010	47PF
228	C507	3101054710010	470PF
229	C513	3101054710010	470PF
230	C521	3101054710010	470PF
231	C549	3101054710010	470PF
232	C532	3101055600000	56PF
233	C545	3101055600000	56PF
234	C138	3101060200010	2PF
235	C438	3101060200010	2PF
236	C440	3101060200010	2PF
237	C142	3101060300010	3PF
238	C200	3101060300010	3PF
239	C202	3101050300000	3PF
240	C508	3101050300000	3PF
241	C428	3101063000010	30PF
242	C447	3101063000010	30PF
243	C112	3101063690000	3.6PF
244	C115	3101063690000	3.6PF
245	C204	3101063690000	3.6PF
246	C128	3101060500010	5PF
247	C133	3101060500010	5PF
248	C139	3101060500010	5PF
249	C143	3101060500010	5PF
250	C146	3101060500010	5PF
251	C149	3101060500010	5PF

No.	Ref. No.	Part No.	Description
252	C116	3101060600010	6PF
253	C120	3101060600010	6PF
254	C135	3101060600010	6PF
255	C463	3101060600010	6PF
256	C205	3101060700020	7PF
257	C132	3101060800010	8PF
258	C469	3101060800010	8PF
259	C478	3101060800010	8PF
260	C484	3101060800010	8PF
261	C495	3101060800010	8PF
262	C140	3101061000000	10PF
263	C472	3101061000000	10PF
264	C424	3101061010010	100PF
265	C425	3101061010010	100PF
266	C486	3101061010010	100PF
267	C488	3101061010010	100PF
268	C627	3101061010010	100PF
269	C628	3101061010010	100PF
270	C631	3101061010010	100PF
271	C632	3101061010010	100PF
272	C637	3101061010010	100PF
273	C638	3101061010010	100PF
274	C639	3101061010010	100PF
275	C640	3101061010010	100PF
276	C651	3101061010010	100PF
277	C652	3101061010010	100PF
278	C653	3101061010010	100PF
279	C654	3101061010010	100PF
280	C679	3101061010010	100PF
281	C680	3101061010010	100PF
282	C681	3101061010010	100PF
283	C682	3101061010010	100PF
284	C407	3101061020000	1000PF
285	C408	3101061020000	1000PF
286	C464	3101061020000	1000PF
287	C485	3101061020000	1000PF
288	C496	3101061020000	1000PF
289	C602	3101061020000	1000PF
290	C603	3101061020000	1000PF
291	C605	3101061020000	1000PF
292	C614	3101061020000	1000PF
293	C615	3101061020000	1000PF

No.	Ref. No.	Part No.	Description
294	C617	3101061020000	1000PF
295	C625	3101061020000	1000PF
296	C626	3101061020000	1000PF
297	C633	3101061020000	1000PF
298	C635	3101061020000	1000PF
299	C636	3101061020000	1000PF
300	C641	3101061020000	1000PF
301	C642	3101061020000	1000PF
302	C643	3101061020000	1000PF
303	C644	3101061020000	1000PF
304	C647	3101061020000	1000PF
305	C650	3101061020000	1000PF
306	C655	3101061020000	1000PF
307	C656	3101061020000	1000PF
308	C660	3101061020000	1000PF
309	C661	3101061020000	1000PF
310	C663	3101061020000	1000PF
311	C666	3101061020000	1000PF
312	C668	3101061020000	1000PF
313	C669	3101061020000	1000PF
314	C671	3101061020000	1000PF
315	C672	3101061020000	1000PF
316	C674	3101061020000	1000PF
317	C675	3101061020000	1000PF
318	C677	3101061020000	1000PF
319	C678	3101061020000	1000PF
320	C683	3101061020000	1000PF
321	C684	3101061020000	1000PF
322	C685	3101061020000	1000PF
323	C405	3101061030010	0.01UF
324	C457	3101061030010	0.01UF
325	C102	3101061040010	0.1UF
326	C104	3101061040010	0.1UF
327	C107	3101061040010	0.1UF
328	C123	3101061040010	0.1UF
329	C126	3101061040010	0.1UF
330	C129	3101061040010	0.1UF
331	C165	3101061040010	0.1UF
332	C190	3101061040010	0.1UF
333	C197	3101061040010	0.1UF
334	C198	3101061040010	0.1UF
335	C401	3101061040010	0.1UF

No.	Ref. No.	Part No.	Description
336	C409	3101061040010	0.1UF
337	C411	3101061040010	0.1UF
338	C467	3101061040010	0.1UF
339	C468	3101061040010	0.1UF
340	C473	3101061040010	0.1UF
341	C474	3101061040010	0.1UF
342	C475	3101061040010	0.1UF
343	C482	3101061040010	0.1UF
344	C483	3101061040010	0.1UF
345	C604	3101061040010	0.1UF
346	C606	3101061040010	0.1UF
347	C618	3101061040010	0.1UF
348	C623	3101061040010	0.1UF
349	C648	3101061040010	0.1UF
350	C658	3101061040010	0.1UF
351	C659	3101061040010	0.1UF
352	C667	3101061040010	0.1UF
353	C673	3101061040010	0.1UF
354	L424	3101061040010	0.1UF
355	C601	3101061050020	1UF
356	C613	3101061050020	1UF
357	C616	3101061050020	1UF
358	C634	3101061050020	1UF
359	C645	3101061050020	1UF
360	C646	3101061050020	1UF
361	C649	3101061050020	1UF
362	C657	3101061050020	1UF
363	C662	3101061050020	1UF
364	C670	3101061050020	1UF
365	C676	3101061050020	1UF
366	C170	3101061230000	0.012UF
367	C113	3101061500010	15PF
368	C199	3101061500010	15PF
369	C430	3101061500010	15PF
370	C433	3101061500010	15PF
371	C470	3101061500010	15PF
372	C101	3101061520010	1500PF
373	C108	3101061520010	1500PF
374	C109	3101061520010	1500PF
375	C117	3101061520010	1500PF
376	C122	3101061520010	1500PF
377	C125	3101061520010	1500PF

No.	Ref. No.	Part No.	Description
378	C130	3101061520010	1500PF
379	C131	3101061520010	1500PF
380	C148	3101061520010	1500PF
381	C154	3101061590010	1.5PF
382	C460	3101061590010	1.5PF
383	C431	3101061800000	18PF
384	C441	3101061800000	18PF
385	C471	3101061800000	18PF
386	C476	3101061800000	18PF
387	C487	3101061800000	18PF
388	C160	3101062000000	20PF
389	C161	3101062000000	20PF
390	C494	3101062000000	20PF
391	C134	3101062200010	22PF
392	C402	3101062210000	220PF
393	C410	3101062210000	220PF
394	C412	3101062210000	220PF
395	C466	3101062210000	220PF
396	C166	3101062240000	0.22UF
397	C451	3101062240000	0.22UF
398	C522	3101062240000	0.22UF
399	C111	3101062400010	24PF
400	C136	3101062400010	24PF
401	C481	3101062400010	24PF
402	C127	3101062700010	27PF
403	L430	3101062700010	27PF
404	C493	3101062710000	270PF
405	C119	3101063300000	33PF
406	C137	3101063300000	33PF
407	C150	3101063300000	33PF
408	C114	3101063900000	39PF
409	C144	3101063900000	39PF
410	C461	3101064590010	4.5PF
411	C442	3101064700000	47PF
412	C443	3101064700000	47PF
413	C103	3101064710000	470PF
414	C105	3101064710000	470PF
415	C106	3101064710000	470PF
416	C456	3101064710000	470PF
417	C458	3101064710000	470PF
418	R458	3101061200000	12PF
419	C151	3101051520000	1500PF

No.	Ref. No.	Part No.	Description
420	C465	3101061600000	16PF
421	C517	3101052230000	0.022UF
422	C147	3101068200000	82PF
423	C176	3101071050160	1UF
424	C189	3101074740000	0.47UF
425	C664	3101081060010	10UF
426	C665	3101081060010	10UF
427	C548	3104071050070	1UF
428	C178	3104071060070	10UF
429	C520	3104071060070	10UF
430	C110	3104074750070	4.7UF
431	L130	3210306390000	39nH
432	L133	3210306390000	39nH
433	L427	3210306470000	47nH
434	L132	3210306820000	82nH
435	L404	3210306820000	82nH
436	L517	3210406331000	330nH
437	L511	3213306102000	1uH
438	L112	3212106221000	220nH
439	L406	3217107470010	47nH
440	L407	3217107470010	47nH
441	L408	3217107470010	47nH
442	L431	3217107470010	47nH
443	L432	3217107470010	47nH
444	C479	3210406471000	470nH
445	L425	3210406471000	470nH
446	L124	3212106689000	6.8nH
447	L131	3212106689000	6.8nH
448	L429	3212206181000	180nH
449	L403	3213209151000	150nH
450	L610	3213209471000	470nH
451	L505	3213212103000	10uH
452	L506	3213212103000	10uH
453	L516	3213212332000	3.3uH
454	L128	3213306561000	0.56uH
455	R517	3213306561000	0.56uH
456	L518	3213306682000	6.8uH
457	L426	3213306821000	0.82uH
458	L110	3217106181010	180nH
459	L113	3217106470000	47nH
460	L418	3217106470000	47nH
461	L419	3217106470000	47nH

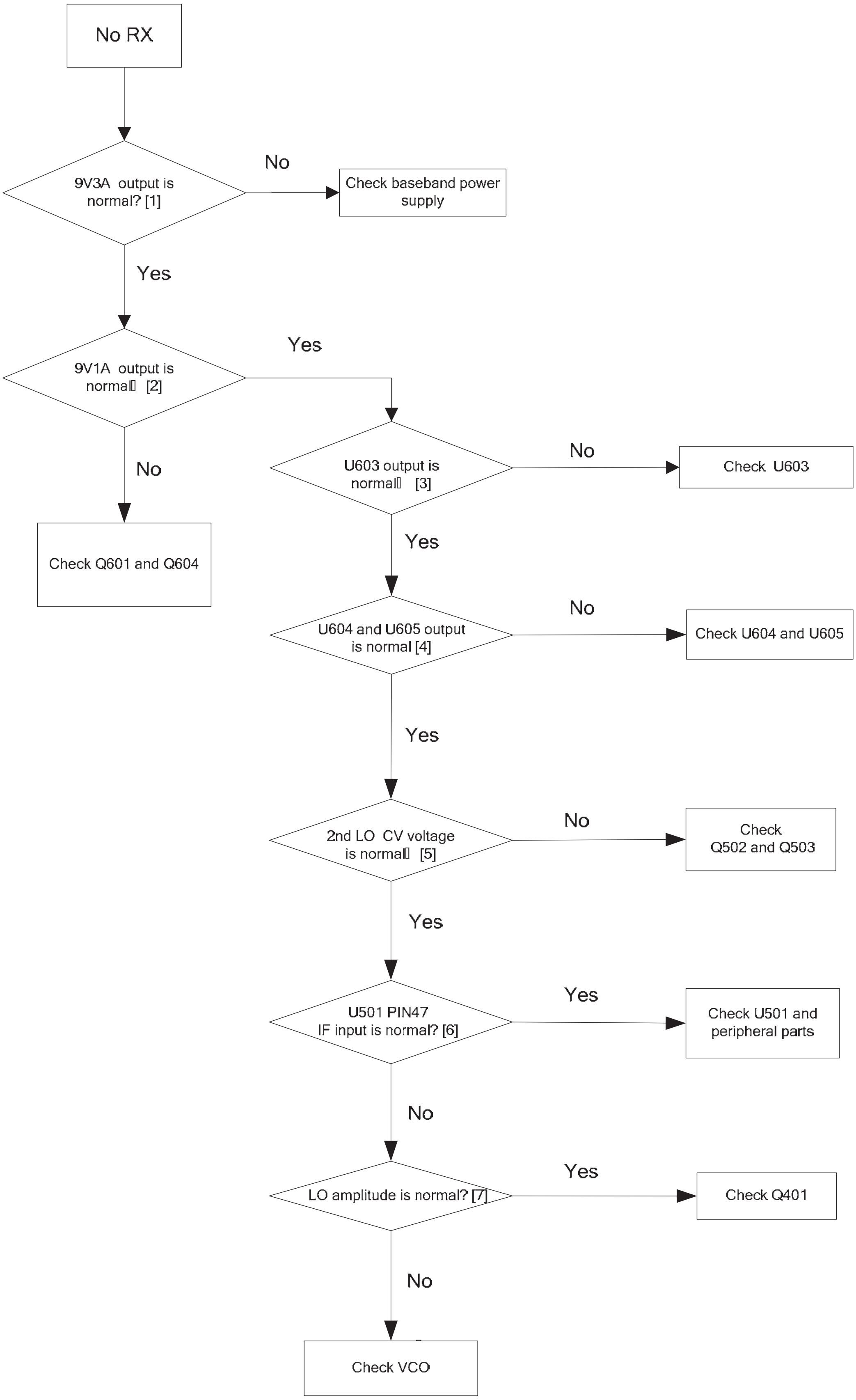
No.	Ref. No.	Part No.	Description
462	L420	3217106470000	47nH
463	L421	3217106470000	47nH
464	L107	3217607680000	68nH
465	L119	3217607680000	68nH
466	L101	3217607681000	680nH
467	L104	3217607681000	680nH
468	L105	3217607681000	680nH
469	L109	3217607681000	680nH
470	L111	3217607681000	680nH
471	L114	3217607681000	680nH
472	L118	3217607681000	680nH
473	L120	3217607681000	680nH
474	L102	3221506601000	Ferrite bead
475	L103	3221506601000	Ferrite bead
476	L108	3221506601000	Ferrite bead
477	L121	3221506601000	Ferrite bead
478	L122	3221506601000	Ferrite bead
479	L123	3221506601000	Ferrite bead
480	L125	3221506601000	Ferrite bead
481	L126	3221506601000	Ferrite bead
482	L127	3221506601000	Ferrite bead
483	L401	3221506601000	Ferrite bead
484	L402	3221506601000	Ferrite bead
485	L417	3221506601000	Ferrite bead
486	L422	3221506601000	Ferrite bead
487	L501	3221506601000	Ferrite bead
488	L502	3221506601000	Ferrite bead
489	L503	3221506601000	Ferrite bead
490	L504	3221506601000	Ferrite bead
491	L508	3221506601000	Ferrite bead
492	L509	3221506601000	Ferrite bead
493	L510	3221506601000	Ferrite bead
494	L512	3221506601000	Ferrite bead
495	L514	3221506601000	Ferrite bead
496	L515	3221506601000	Ferrite bead
497	L601	3221506601000	Ferrite bead
498	L602	3221506601000	Ferrite bead
499	L603	3221506601000	Ferrite bead
500	L604	3221506601000	Ferrite bead
501	L605	3221506601000	Ferrite bead
502	L606	3221506601000	Ferrite bead
503	L607	3221506601000	Ferrite bead

No.	Ref. No.	Part No.	Description
504	L608	3221506601000	Ferrite bead
505	L609	3221506601000	Ferrite bead
506	L611	3221506601000	Ferrite bead
507	L414	3233099185900	Air-core inductor
508	L415	3233099185900	Air-core inductor
509	l435	3233099185900	Air-core inductor
510	l436	3233099185900	Air-core inductor
511	L117	3237110220000	Air-core inductor
512	L106	3237110270000	Air-core inductor
513	L507	3297107391000	390nH
514	D102	3303240000000	Switching diode
515	D110	3303240000000	Switching diode
516	D501	3303240000000	Switching diode
517	D502	3304010100220	Varactor
518	D424	3304010100390	Varactor
519	D426	3304010100390	Varactor
520	D427	3304010100390	Varactor
521	D430	3304010100390	Varactor
522	D503	3304060300010	Varactor
523	D101	3304060300050	Varactor
524	D103	3304060300050	Varactor
525	D104	3304060300050	Varactor
526	D105	3304060300050	Varactor
527	D106	3304060300050	Varactor
528	D107	3304060300050	Varactor
529	D108	3304060300050	Varactor
530	D109	3304060300050	Varactor
531	D404	3399990000260	Rectifier diode
532	D408	3399990000260	Rectifier diode
533	Q601	3403002000000	PNP transistor
534	Q604	3403002000000	PNP transistor
535	Q104	3403003000060	NPN transistor
536	Q502	3403003000060	NPN transistor
537	Q602	3403008000010	Bias resistor transistor
538	Q603	3403008000010	Bias resistor transistor
539	Q105	3404006000000	NPN transistor
540	Q106	3404006000000	NPN transistor
541	Q402	3404006000000	NPN transistor
542	Q403	3404006000000	NPN transistor
543	Q401	3404999000000	NPN transistor
544	Q503	3408002000000	NPN transistor
545	Q101	3408002000080	NPN transistor

No.	Ref. No.	Part No.	Description
546	Q107	3408002000080	NPN transistor
547	Q103	3499000000150	Composite transistor
548	Q102	3503010000010	P-MOSFET
549	U402	3601039000060	LNA amplifier
550	U501	3603999000000	IF processor IC
551	U101	3604019000000	PLL IC
552	U106	3605002057090	Operational amplifier
553	U401	3605008001690	Operational amplifier
554	U601	3608006000000	Power management IC
555	U604	3608006000000	Power management IC
556	U605	3608006000000	Power management IC
557	U602	3608020000000	Power management IC
558	U603	3608020000000	Power management IC
559	U606	3608020000000	Power management IC
560	U403	3609014000010	Mixer
561	U105	3616010000000	Switch IC
562	U103	3616059000000	Switch IC
563	X101	3701019250030	Temperature compensated crystal oscillator
564	Z401	3802448540040	Crystal filter

12.8 Troubleshooting Flow Chart

Receiver Circuit



Description of Normal Situations:

[1] About 9.3V for receiver board.

[2] About 9.1V for pin 2 of Q601 and Q604.

[3] About 5V for pin 5 of U603.

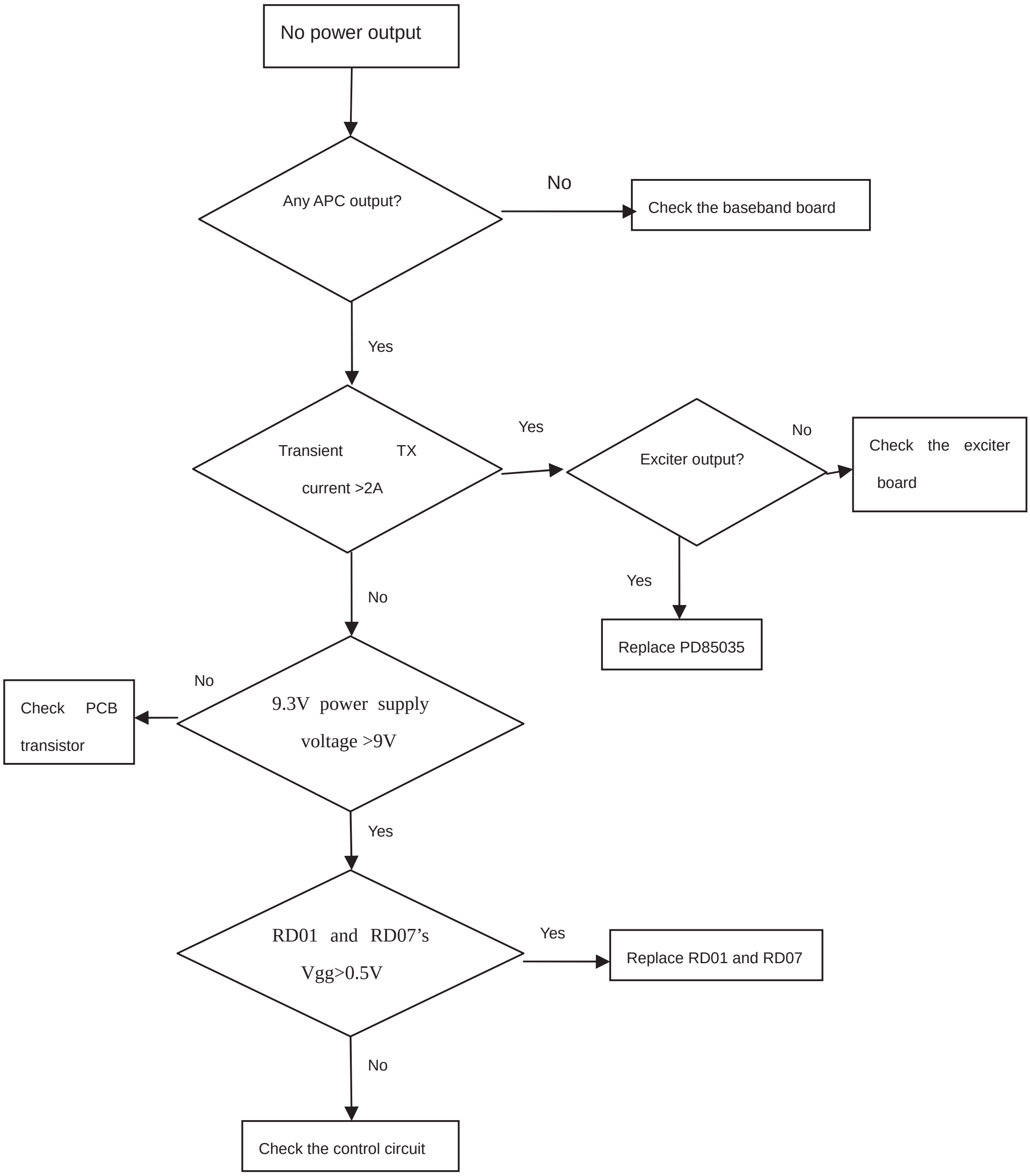
[4] About 3.3V for pin 5 of U604 and U605.

[5] Normal CV voltage is 2.5-4.4V. The test point is TP504.

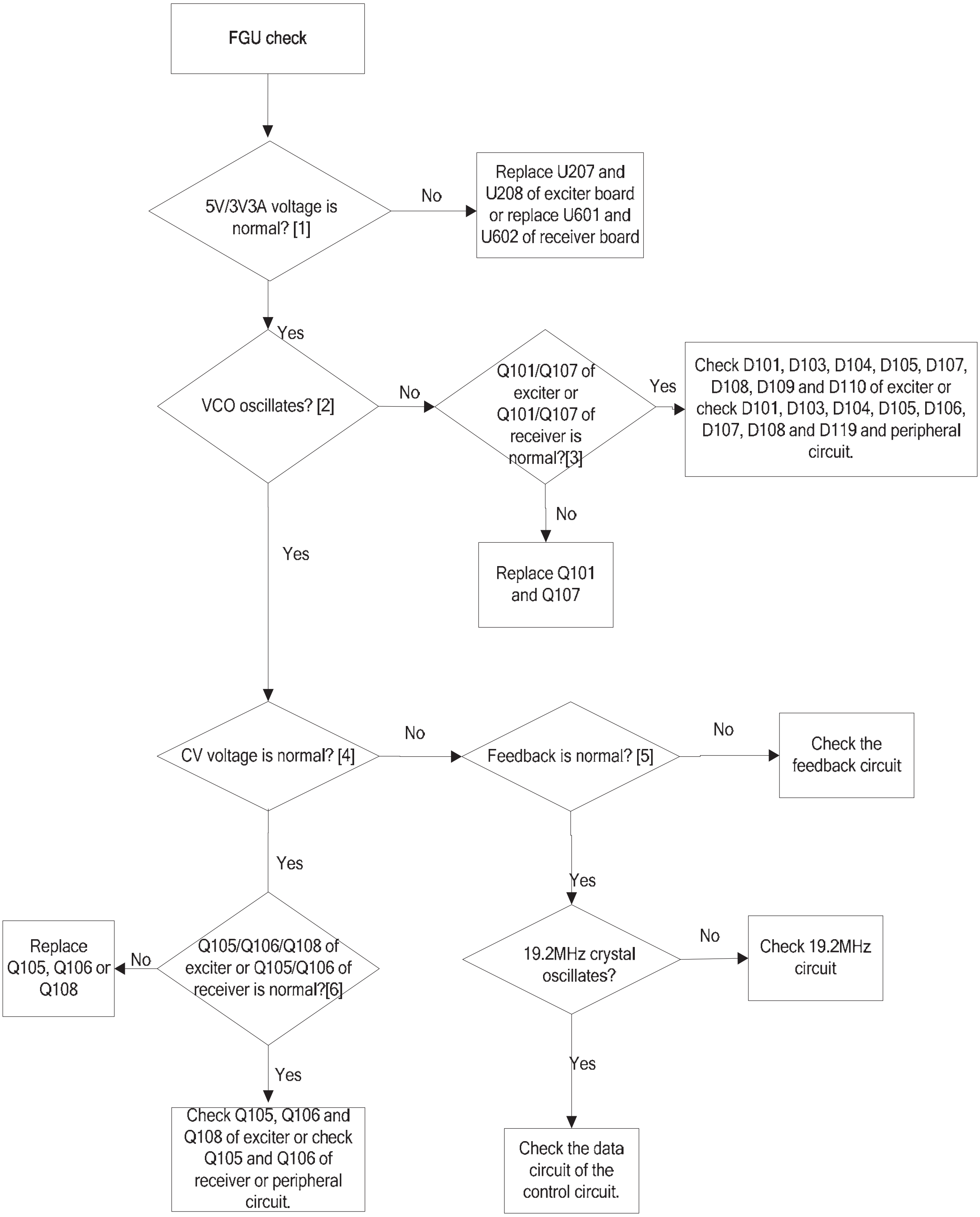
[6] Disconnect the front-end circuit and input 44.85MHz IF signal at pin 47 of U501; the sensitivity should be about-107dBm.

[7] Amplitude of 1st LO is 16-19dBm.

Transmitter Circuit



FGU Circuit


FGU check
5V/3V3A voltage is normal? [1]
No
Replace U207 and U208 of exciter board or replace U601 and U602 of receiver board
Yes
VCO oscillates? [2]
No
Q101/Q107 of exciter or Q101/Q107 of receiver is normal?[3]
Yes
Check D101, D103, D104, D105, D107, D108, D109 and D110 of exciter or check D101, D103, D104, D105, D106, D107, D108 and D119 and peripheral circuit.
No
Replace Q101 and Q107
Yes
CV voltage is normal? [4]
No
Feedback is normal? [5]
No
Check the feedback circuit
Yes
Yes
Q105/Q106/Q108 of exciter or Q105/Q106 of receiver is normal?[6]
No
Replace Q105, Q106 or Q108
Yes
Check Q105, Q106 and Q108 of exciter or check Q105 and Q106 of receiver or peripheral circuit.
19.2MHz crystal oscillates?
No
Check 19.2MHz circuit
Yes
Check the data circuit of the control circuit.

Description of Normal Situations:

[1] VCO: 5V; PLL: 3.3V;

[2] Frequency output for low VCO is 120～170MHz, and 140～190MHz for high VCO. The power output amplitude for both is -8～18dBm;

[3] CV voltage of Q101 and Q107: about 4V; the voltage difference between base voltage and emitter voltage is about 0.6V;

[4] Normal CV voltage is 0.6V-4.4V;

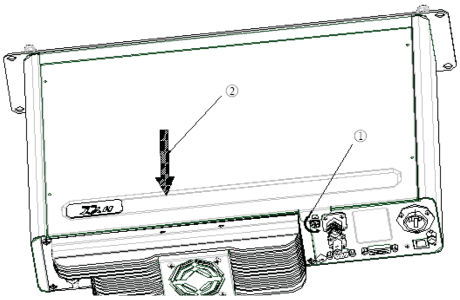
[5] Normal feedback amplitude is -8～-17dBm;

[6] CV voltage of Q105, Q106 and Q108: about 6V; the voltage difference between base voltage and emitter voltage is about 0.6V;

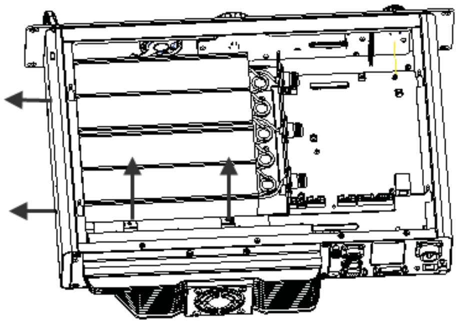
13. Disassembly and Assembly

Disassembly

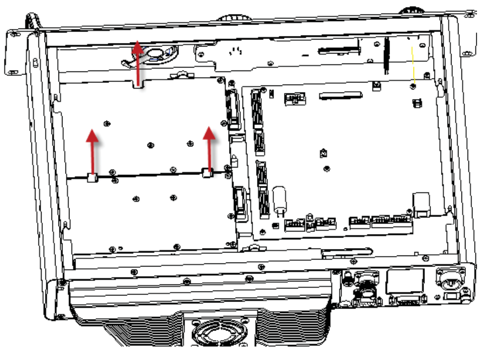
1. Turn off this product and remove the power cord, antenna as well as signal cable.
2. Loosen the screws behind the top cover, and then pull the cover to remove it.



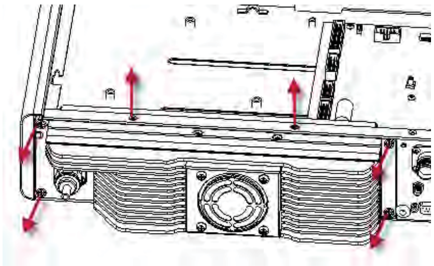
3. Remove the four screws locking the duplexer, and then take the duplexer out.



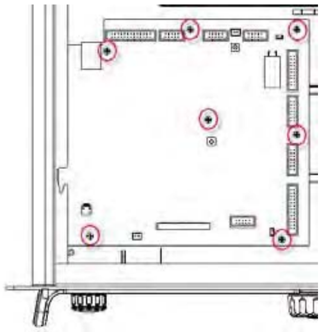
4. Remove the data cable and RF cable between the baseband board and the TX exciter module. Then remove the three screws locking the TX exciter module, and take it out.



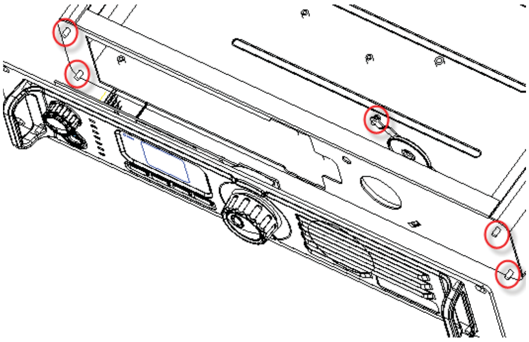
5. Remove the six screws locking the PA heat sink, and then take it out.



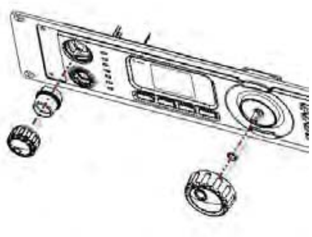
6. Remove the seven screws locking the baseband board, and then take it out.

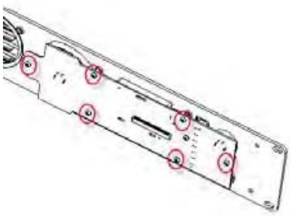


7. Remove the four screws locking the front panel and the screw locking the speaker, and then remove the front panel.



8. Pull out the Navigation knob, the nut locking the encoder switch, the Volume Control knob and the light guide. Then remove the six screws locking the front panel PCB and take the PCB out.

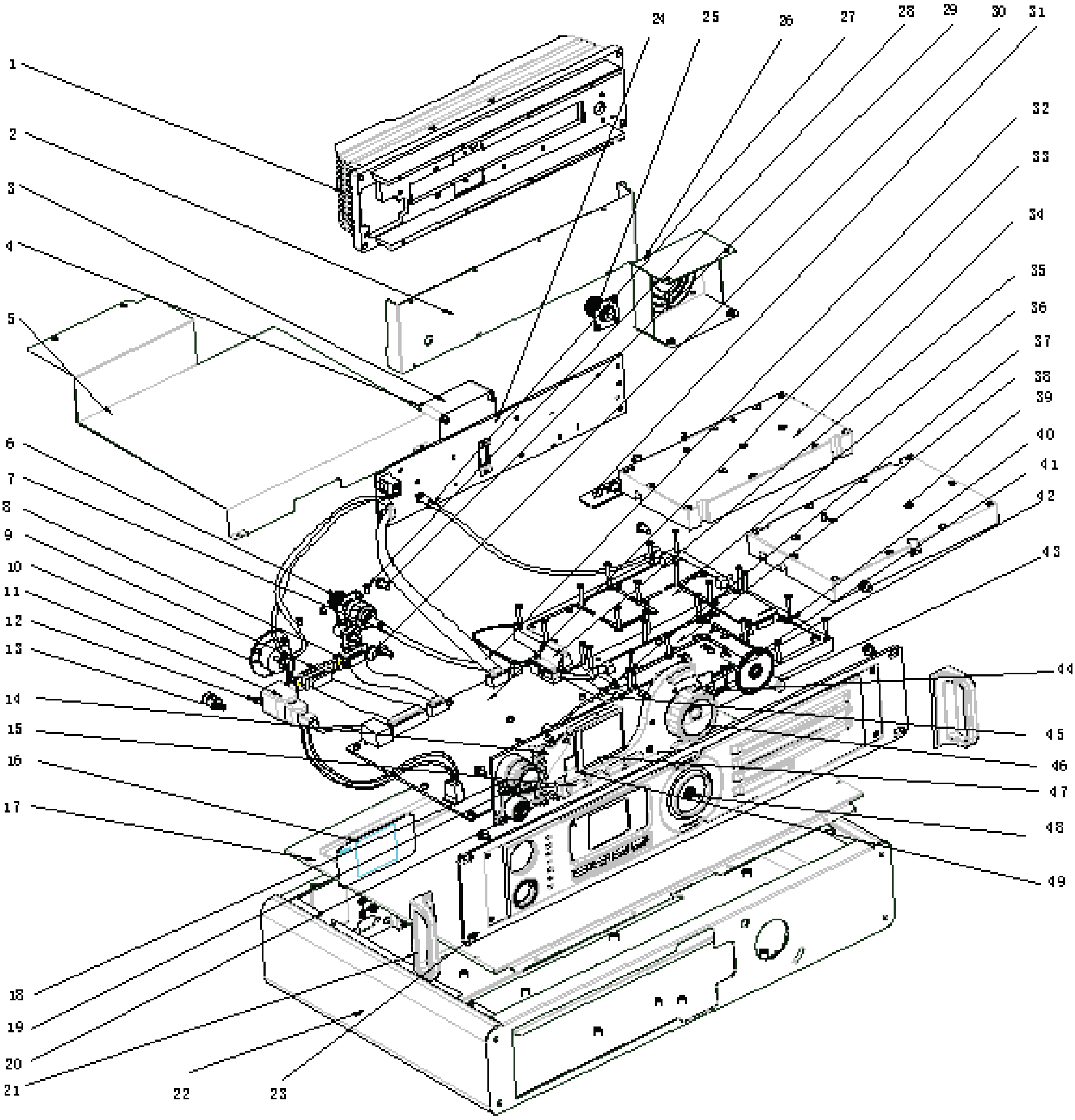




Assembly

To assemble the radio, perform the above steps in a reverse way.

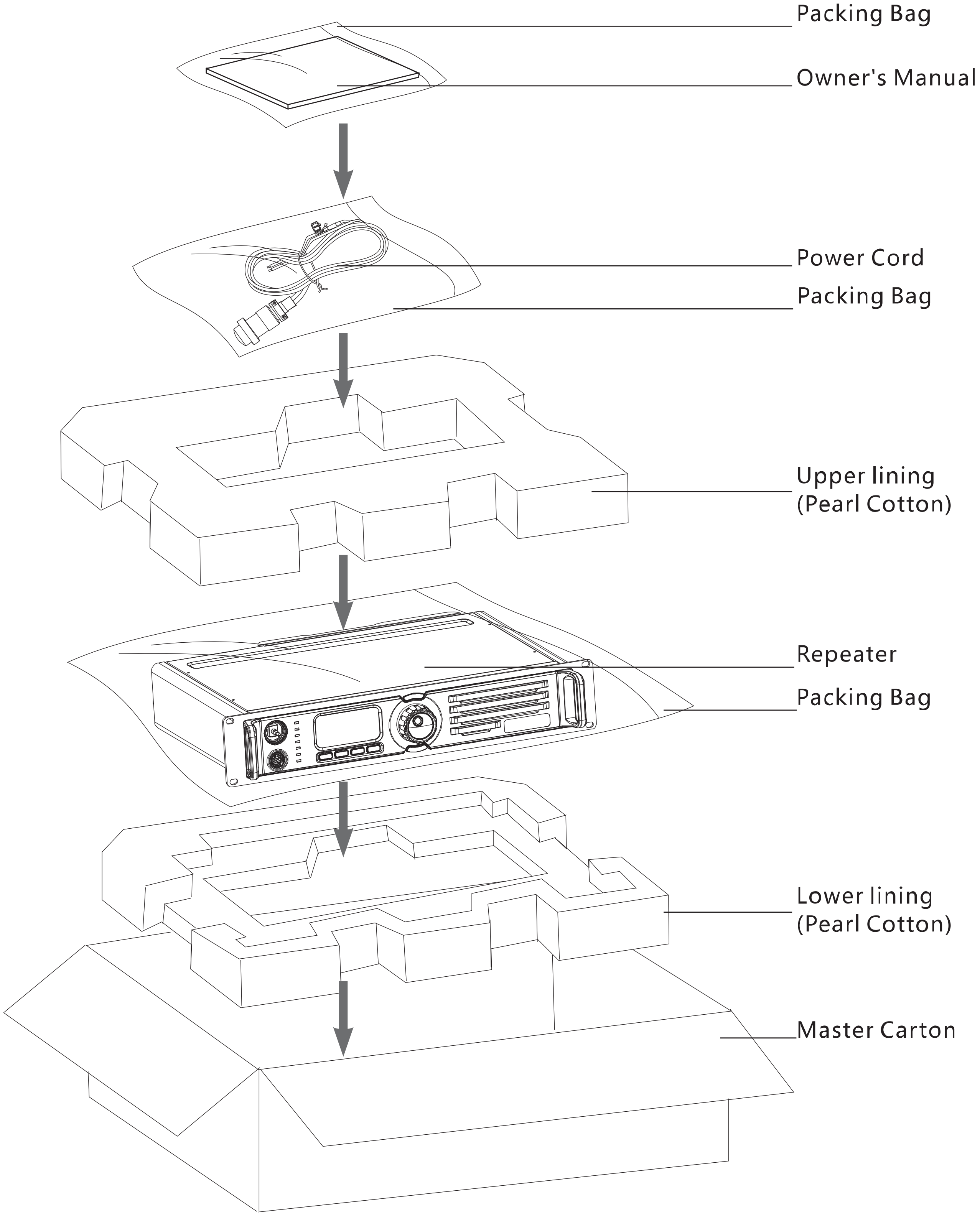
14. Exploded View



No.	Part No.	Description	Qty.
1	7000233000000	Heat sink	1
2	6201895000000	Cover for heat sink	1
3	NA	Fan for heat sink 00	1
4	7104016020100	Self-tapping screw	4
5	6201896000000	Cover for baseband PCB	1
6	4408100002000	Adapter	1
7	4220250000500	RF cable	1
8	4210120000600	Signal cable	1
9	4210120000700	Signal cable	1
10	4200280000000	1/2 power cord	1
11	4290075000000	Adaption cable for Ethernet port	1
12	710306004000	Machine screw	10
13	7104008000000	Ground terminal	1
14	6001107000000	Fixing bracket for LED indicator	1
15	6100497000000	Keys on front panel	1
16	6001138000000	LCD lens	1
17	6201857000000	Top cover of housing	1
18	6000873000000	Light guide	1
19	6000876000000	Encoder knob	1
20	6001108000000	Fixing bracket for audio interface	1
21	6300114000000	Handle	2
22	6201857000000	Housing	1
23	6201871000000	Front panel	1
24	NA	PCB kit for PA	1
25	NA	Antenna connector	1
26	6201894000000	Fan cover	1
27	4220250000400	Metric screw	1
28	7103008001300	RF cable	6

29	7104010000000	Metric screw	6
30	6100553200000	Cable sleeve	1
31	NA	Logo and model label	1
32	4210120000500	Signal cable	1
33	NA	Semi-finished baseband	1
34	6201873000000	Top cover of shielding box for exciter module	1
35	4210050001900	Signal cable	1
36	NA	Semi-finished exciter module	1
37	4220130000000	RF cable	1
38	NA	RX module	1
39	6201874000000	Top cover of shielding box for exciter module	1
40	6201872000000	Bottom cover of shielding box for exciter module & RX module	1
41	5001210000240	Speaker	1
42	5001106000000	Navigation knob	1
43	7000222000000	Speaker fixing ring	1
44	7103005000400	Screw + stud	6
45	4210050001800	Signal cable	1
46	6201739000000	Inner lining of knob	1
47	5130000000040	TFT LCD	1
48	7207003700000	Nut	1
49	6001078000000	LCD bracket	1

15. Packing Guide



16. Specifications

General		
Frequency Range		UHF1: 400-470MHz UHF2: 450-520MHz UHF3: 350-400MHz VHF: 136-174MHz
Channel Capacity		16
Channel Spacing		12.5kHz/20kHz/25kHz
Operating Voltage		13.6V±15%
Current Drain	Standby	<0.8A
	Transmit	<11A
Frequency Stability		± 0.5ppm
Antenna Impedance		50Ω
Duty Cycle		100%
Dimensions (H×W×D)		88 X 483 X 366 mm(3.4 X 19.0 X 14.4 inch)
Weight		8.5 kg(18.7 lbs)
LCD Display		220×176 pixels, 262000 colors 2.0 inch, 4 rows
Transmitter		
Power Output		5-50W
FM Modulation		11K0F3E@12.5kHz 14K0F3E@20kHz 16K0F3E@25kHz
4FSK digital modulation		**12.5kHz (data): 7K60FXD** **12.5kHz (data&audio) 7K60FXW**
Conducted/Radiated Emission		-36dBm <1GHz -30dBm >1GHz
Modulation Limiting		±2.5 kHz @ 12.5 kHz ±4.0 kHz @ 20 kHz ±5.0 kHz @ 25 kHz
FM Noise:		-40dB @ 12.5 kHz -43dB @ 20 kHz -45dB @ 25 kHz
Adjacent Channel Power		60dB@12.5kHz 70dB@20 /25kHz
Audio Response		+1 ~ -3dB
Audio Distortion		≤3%
Vocoder Type		AMBE++ or SELP
Digital Protocol		ETSI-TS102 361-1,-2,-3
Receiver		
Sensitivity	Analog	0.3μV (12dB SINAD) 0.22μV (Typical) (12dB SINAD) 0.4μV (20dB SINAD)

	Digital	0.3uV/BER5%
Adjacent Channel Selectivity TIA-603 ETSI		65dB @ 12.5 kHz ； 75dB @ 20/25 kHz 65dB @ 12.5 kHz ； 75dB @ 20/25 kHz
Intermodulation TIA-603 ETSI		75dB @ 12.5/20/25 kHz 70dB @ 12.5/20/25 kHz
Spurious Response Rejection TIA-603 ETSI		80dB @ 12.5/20/25 kHz 80dB @ 12.5/20/25 kHz
Blocking TIA-603 ETSI		90dB 90dB
FM Noise:		-40dB@12.5kHz -43dB@20kHz -45dB@25kHz
Rated Audio Power Output		0.5W
Rated Audio Distortion		≤3%
Audio Response		+1 ~ -3dB
Conducted Spurious Emission		<-57dBm
Environmental Specifications		
Operating Temperature		-30℃～+60℃
Storage Temperature		-40℃～+85℃

All Specifications are tested according to applicable standards, and subject to change without notice due to continuous development.

17. Table of Blind Spots

No.	UHF1 (400-470MHz) Blind Spot (MHz)
1	403.2
2	422.4
3	441.6
4	460.8
5	414
6	432
7	450
8	468
9	408
10	420

No.	UHF2 (450-520MHz) Blind Spot (MHz)
1	460.8
2	480
3	499.2
4	518.4
5	450
6	468
7	486
8	504

No.	UHF3 (350-400MHz) Blind Spot (MHz)
1	360
2	364.8
3	378
4	384
5	396

No.	VHF (136-174MHz) Blind Spot (MHz)
1	153.6
2	172.8
3	144
4	162